The Electrical Industry's Weekly Magazine

October 12, 1959

Electrical World

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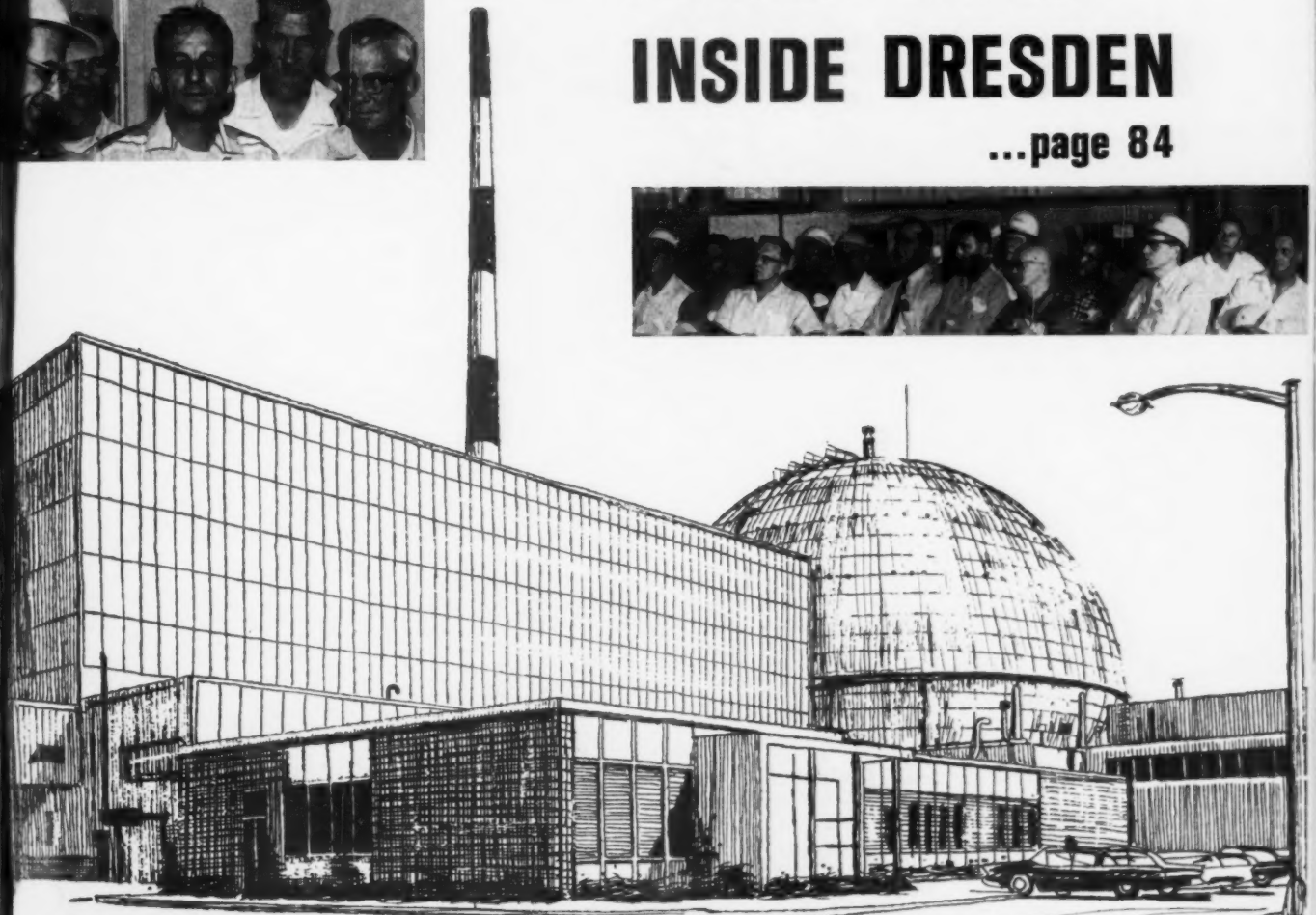
PUBLIC LOOKS INSIDE DRESDEN

...page 84



Rebuilding Job Begins In Hurricane's Wake... p86

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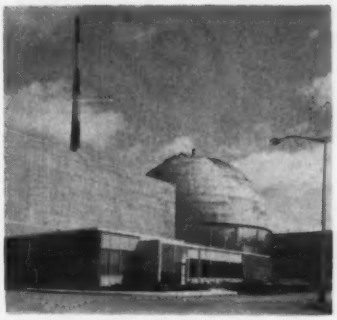
LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

Electrical World

Vol. 152, No. 15 OCTOBER 12, 1959

Published for 85 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue



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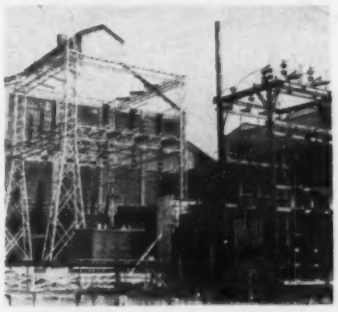

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Rebuilding Job Begins in Hurricane's Wake

South Carolina E&G, badly battered along coastal area, calls on neighbors for help in rehabilitating system.....p 86

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More than 15,000 visitors learn the fundamentals and are reassured on safety before fuel is loaded.....p 84

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R. V. Bruce, Westinghouse Electric Corp

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Planning sample meter testing?

The success of your sample testing of tomorrow depends on the meters you buy today

Simplification of testing procedures can save your company up to 50% in meter testing costs. But the success of sample testing depends on the overall accuracy of the meters on your lines. 5 and 10 amp meters put a definite roadblock in the path of random sample testing by requiring tests up to ten times as often as modern meters. The meters you buy today can directly affect your sample testing of tomorrow.

Utility commissions are much more likely to approve the use of cost-saving testing methods if the meters on your system have sustained accuracy.

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LETTERS

It Is a Matter of Emphasis

To the Editor:

On page 24 of Electrical World for Sept. 21, the following sentence appears:

"Engineers who use the present value method to determine the return from a proposed investment of capital should be aware of a significant fallacy in the assumptions upon which the method is based."

This comment may cause unnecessary misgivings among those who have not read Mr. Baldwin's article.

In the utility industry, probably the most widely used procedure for investigating alternative proposals for capital investment is to estimate revenue requirements of the projects. Quite often proposals differ as to timing of expenditures, and in such case it is desirable to discount future transactions to their "present worth."

There is no fallacy, significant or otherwise, in the assumptions on which such calculations are based.

Mr. Baldwin's article related to a distinctly different procedure, not very widely used by engineers, best known as the "discounted-cash-flow" method. That technique does not deal with revenue requirements. It starts by estimating revenues obtainable (which may be greater or less than required), subtracts expenses to find earnings, and expresses those earnings as a percentage of investment by a discounting process.

It is quite true, as Mr. Baldwin pointed out, that there is an error in reasoning inherent in the "discounted-cash-flow" computation.

The revenue-requirements approach, on the other hand, starts with an estimate of minimum acceptable rate of return on the company pool of capital; not the expected rate of return on the individual project under investigation. What Mr. Baldwin properly emphasized is that significant difference between "company-pool" and "individual-project" rate of return. He found no fault with the concept of "present worth."

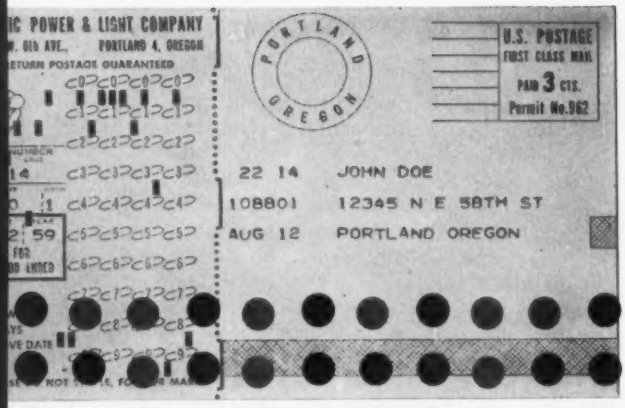
Paul H. Jeynes
Engineering Economist
Public Service E&G Co
80 Park Place
Newark 1, N. J.

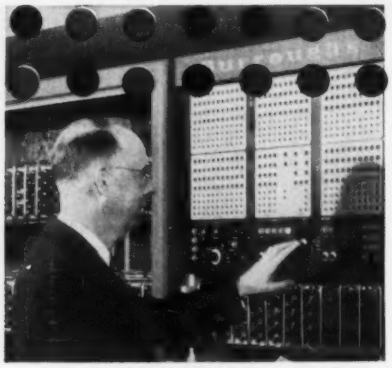
COMING NEXT WEEK . . . Full report on the National Power Conference held in Kansas City . . . Story of the microwave system linking power houses along the crooked Feather Canyon . . . And how to squeeze more capacity into substation sites.

A Statement from Pacific Power & Light:

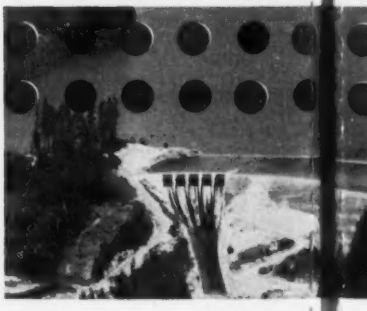
"Our Burroughs 205 computer saves us money in many ways..."

Paul B. McKee, Chairman of the Board and Don C. Frisbee, Treasurer





Programming Head Vern C. Thomas



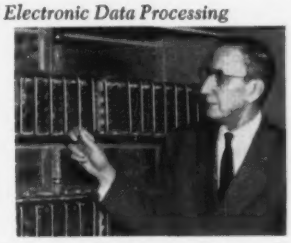
"Our Burroughs 205 computer saves us money in many ways . . . Customer Billing, Accounting, Plant Expansion Studies, and Area and Resource Development."

PAUL B. MCKEE
Chairman of the Board, Pacific Power & Light

In many ways, a Burroughs 205 electronic data processing system is serving over 300,000 customers in the Great Northwest. The system is installed at Pacific Power & Light in Portland, Oregon, and is currently being used for accounting and engineering jobs.

In 1948 the billing at Pacific Power & Light was centralized on key-driven equipment. Three years later, a forward-thinking management initiated studies of the electronic data processing field. Stanford Research Institute was called in to work with key PP&L accounting personnel in doing a study. After an exhaustive report on computer requirements prepared in 1956, management was ready to make a selection. States PP&L's Chairman of the Board Paul B. McKee, *"We were satisfied that we had researched the problem thoroughly and were able to make a completely objective choice. We purchased a Burroughs 205 system simply because it supplied the best answer to our needs."* Delivery of the 205 was in May, 1957. The customary step from key-driven machines to punched card equipment was completely bypassed, and the first electronically processed bills were sent out in July of 1957. Regarding their venture into electronic data processing equipment, PP&L's treasurer Don C. Frisbee says, *"At the time we made the jump into electronic data processing there was no established precedent in the utility field. However, with our problems of mounting paperwork, plus our growing needs for solutions to so many engineering problems, we felt it was necessary to make a pioneering move from key-driven equipment directly to an EDP system."*

David P. Landry, Supervisor of Electronic Data Processing



Dr. James Ward, Director of Research

The customer accounting task for PP&L's 205 was a stickler because their billing problems are so numerous. PP&L's lines extend through Oregon, Washington, Wyoming, Montana and Idaho, and within this large service territory the company maintains 23 districts and 52 offices. Because its territories are so diverse, there are more than 200 different rate schedules. It also reports to five state commissions.

Despite the many complexities, *in one pass* PP&L's 205 computer now processes 30,000 items in one day. And during this same single pass, it bills customers, updates account records maintained on magnetic tape, processes connect and disconnect orders, local bills, adjustments, cash payments and myriad data changes.

Vice-President and Controller of PP&L, George Mackenzie points out, *"The computer didn't solve our paperwork problems overnight. But then we didn't expect it to. We did expect the 205 to enable us to serve our customers faster and more efficiently...and at considerable savings. It has more than met these expectations."* In addition, David P. Landry, Supervisor of Electronic Data Processing at PP&L says, *"Our 205 has not only been fruitful from a tangible dollars and cents point of view, but the computer is also providing new sources of information for management."*

PP&L's 205 has operated on the average of 17 hours per day over the last two years. The company has not been content to restrict its system solely to commercial data processing. PP&L is using its 205 to solve complex engineering problems concerned with the generation, transmission and distribution of power. One of the engineering problems taken over by the machine is scheduling a most efficient use of water stored behind PP&L's three Lewis River Dams to harness the full power potential of the river. The 205 program is, in effect, a mathematical model of the Lewis River hydroelectric facilities. According to Dr. James Ward, Director of Research, *"Its use has saved many hours of tedious calculations. The computer completes in one minute the solution of an operation study which requires 12 to 14 hours when done manually."*

The 205 is also tackling other thorny engineering problems. Routines have been developed for use in planning and designing transmission lines. Another problem involves the calculation of the large short circuit currents which occur when lightning strikes a line. Dr. Ward anticipates that *"the Burroughs 205, in solving technical problems for us, will provide the capabilities of a large scale analog computer, usually used for this work, and costing several hundred thousand dollars."*

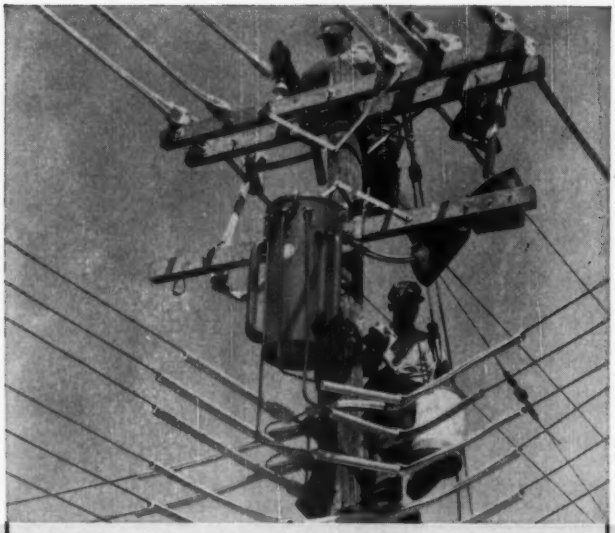
In using their 205, PP&L has formed its own operating team. Board Chairman McKee points out, *"Although our data processing equipment team is composed of our own company-experienced personnel, the training they have received from Burroughs has been invaluable in the success of our program. We have found that the backing and service a manufacturer provides is as important as the equipment itself."*

Today, PP&L is working on extending their accounting and engineering uses of the 205 even further. They are confident in their explorations because the 205 has already proven its versatility. And there is assurance too, because all of Burroughs' complete line of advanced data processing systems are designed with customer expansion in mind. These Burroughs computers are currently aiding hundreds of other business and scientific users. For additional information on how the 205 or other Burroughs computing systems can help in your business, write ElectroData Division, Pasadena, California.

Burroughs Corporation

"NEW DIMENSIONS/in electronics and data processing systems"

The Pole Star Core



New Echelon Lap Means
New Highs in Electrical Efficiency

Example: 7200-volt line, average for all kva sizes

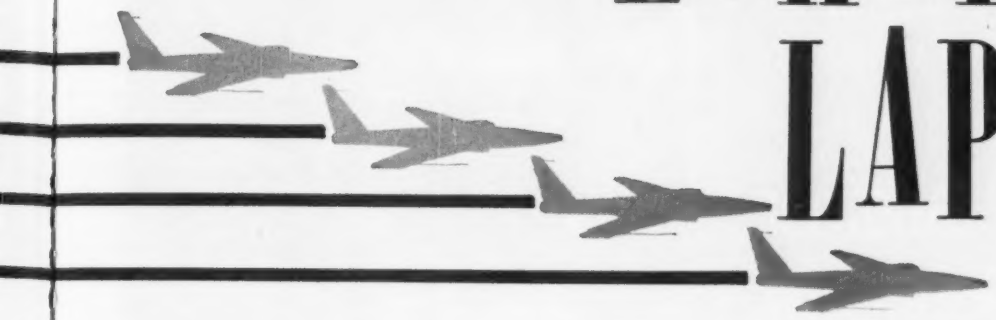
Characteristic	% Improvement over Previously Published Data
Total Loss	7%
Iron Loss	14%
Copper Loss	4%
Exciting Current	39%
Impedance	10%

As in the original time-proved Pole Star core, laminations are individually lapped as the core is built into the coil. Each lamination thus forms its own magnetic path, and no flux has to cross from one turn to the next.

New design retains basic principles proved in thousands of distribution transformer installations

PENNSYLVANIA TRANSFORMER

has a new ECHELON LAP



RESULT: *Lower Losses, Lower Exciting Current Lower Impedance Improved Regulation*

One of but four basic oriented-steel distribution transformer cores being used today, the Pole Star lap-on-top core provided new highs in electrical efficiency when introduced by Pennsylvania Transformer in 1947. So great was the improvement over previous standards that the patented Pole Star core has maintained its leadership for more than a decade without any major alteration in its design.

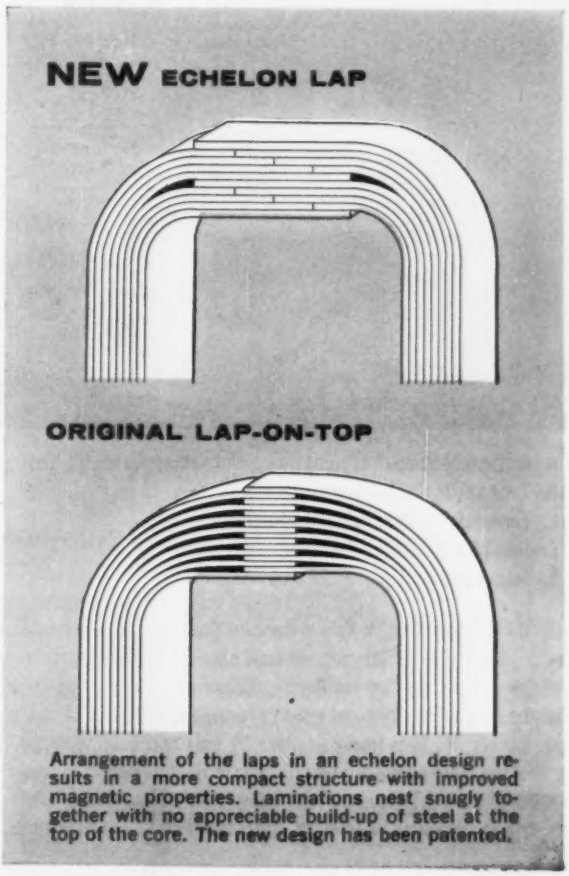
Now, Pennsylvania again takes a long step forward—by giving the Pole Star core a "new look" that reduces total losses as much as 9%, and exciting current as much as 46%. The lap (still located on top of the core) has been changed to an "echelon" pattern that results in a more compact, efficient structure with improved magnetic properties.

Laminations Are Individually Lapped

The basic principle of the time-tested Pole Star core has been retained—that is, laminations are individually lapped as they are built into the coil. Each lamination forms its own magnetic path, and no flux has to cross from one turn to the next.

Along with major reductions in total losses and exciting current, the new echelon lap also provides improved regulation and lower impedance. For more information—or a quotation on your next distribution transformer needs—contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

McGRAW EDISON

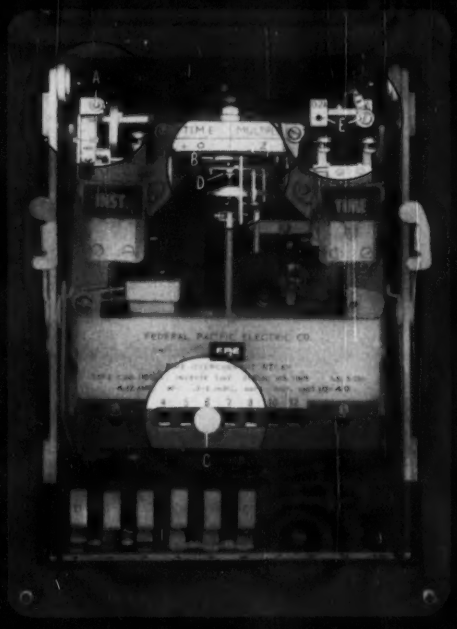


Arrangement of the laps in an echelon design results in a more compact structure with improved magnetic properties. Laminations nest snugly together with no appreciable build-up of steel at the top of the core. The new design has been patented.

PENNSYLVANIA DISTRIBUTION TRANSFORMERS

front adjustment
adds new
relay accessibility

another reason why more utilities are approving FEDERAL PACIFIC PROTECTIVE RELAYS



Individual Relay inspection assures utilities pre-proven reliability.

* A. Instantaneous overcurrent unit pickup adjustment
B. Time setting adjustment
C. Time delay element pickup adjustment
D. Fine pickup adjustment
E. Target and seal-in .2 and 2 amperes

Federal Pacific Protective Relays combine the long and dependable service demanded by utilities with an ease of adjustment never available before. All Federal Pacific Relays are easily adjustable from the front of the unit—no need to remove the chassis from the case. Covers are held firmly in place by only two knurled knobs. Some of the more popular Federal Pacific Protective Relays include: ■ CDG—a time delay overcurrent relay in 3 models, inverse, very inverse and extremely inverse. ■ CDD—a directional inverse time overcurrent relay in 2 models, inverse and very inverse—extremely fast and sensitive. Directional selectivity down to approximately 1% of normal voltage at 1 to 15 times rated current. ■ DDT—a transformer percentage differential relay. Features easy adjustment of slope, pick up and time delay. 20, 30 and 40% slope by tap setting. Self-contained multi-contact relay can be supplied in place of target and seal in unit. ■ VAR42—Immediate and/or delayed reclosing relay—up to 4 reclosures—anti-pumping, instantaneous trip lockout. Completely D-C operated. ■ VDG—an inverse time voltage relay—with or without frequency compensation.

More and more utilities are recognizing the reliability and convenience of Federal Pacific Relays. Why not write today for Bulletin 6200, Federal Pacific Electric Company, General Offices: Department 392, Newark 1, New Jersey.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**
The Best in Electrical Distribution and Control Equipment

The Electrical Week

LATE NEWS ▶

Reservations pour in for EW Electric Heating Conference to be held Oct. 21-22 in St. Louis. Electrical World will also publish findings of its 1959 electric heating and heat pump survey.

Southeastern Electric Exchange utilities to adopt 40-gal. quick recovery water heater as standard. Heavy promotion scheduled in '60.

Highlights from American Gas Assn convention . . . AGA will increase 1960 promotion budget by 39%, from $1.8 to $2.5 million . . . Gas heating manufacturers consider collective promotion of gas heating . . . Laclede Gas Pres R. W. Otto says though electric heating is now more costly, it can't be counted on to remain that way . . . U. S. Chamber of Commerce Pres E. D. Canham calls for less government in business.

Alcoa gets contract for ACSR on N. Y. Power Authority's 145-mile, 345-kv line. Price of $1,690,000 was negotiated by Alcoa after three other firms submitted identical bids of $1,708,240.72.

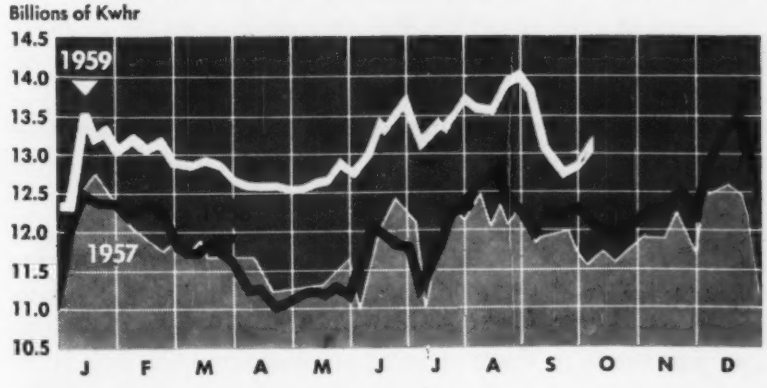
Public Service of Indiana asks PSC approval to up rates about $5.2 million a year gross or $2.5 million net.

Electrical Merchandising, a McGraw-Hill mag, to go weekly with Nov. 23 issue. EM serves the appliance industry primarily.

GOP National Committee's blueprint for the future supports private ownership of A-power reactors, but emphasizes federal government R&D support in teamwork with private enterprise.

Management changes . . . Northern Indiana PS elects W. H. Kussmaul vp of purchasing and stores . . . Pennsylvania Electric Assn elects Duquesne Light vp W. J. Lyman president. VP's elected: G. R. Parry, Metropolitan Ed; P. R. Lawson, Pennsylvania Electric, and P. M. Alden, Philadelphia Electric.

WEEKLY POWER OUTPUT—UP 9.3% (Week ending Oct. 3), Kwhr 13,234,000,000



Per Cent Change From Previous Year

	Sept. 19	Sept. 26	Oct. 3
Total U. S.	+ 4.4	+ 4.3	+ 9.3
New Eng.	+ 4.7	+ 4.5	+ 7.8
Mid. Atlan.	+ 2.7	+ 7.5	+12.1
Cent. Ind.	+ 2.3	+ 4.5	+ 5.3
West Cent.	+ 4.8	+ 5.1	+ 7.1
Southeast	+ 3.9	+ 3.9	+ 7.4
South Cent.	+ 5.6	+10.9	+29.9
Rocky Mount.	+ 6.3	+ 6.0	+ 4.0
Pacific			
NW	+11.4	+ 9.1	+12.1
SW	+ 7.6	+ 6.5	+ 3.2

Seasonally Adjusted Index 256.5

Week Ago 248.8 Year Ago 234.0

Source: Edison Electric Institute

Preview of this Issue

EVENTS ▶ **More than 15,000 visitors toured Dresden Nuclear Power Station** in a six-months open house. They were briefed on operation and safety before reactor achieved criticality (**p 84**) . . . A tally on damages and repair needs still is underway on South Carolina E&G's system where Hurricane Gracie hit hardest. About the same time late last month, snow, rain, and floods brought utility problems in other sections of the U.S. (**p 86**) . . . Utah P&L and Arizona PS will build an interconnecting 230-kv system which could handle the bulk of Glen Canyon's 900-Mw output. The plan is an important leg in ultimate grid for the West (**p 88**) . . . Herbert Hoover officiates at groundbreaking for United Engineering Center in N. Y. (**p 89**).

ENGINEERING ▶ **Production goes on as new substation goes up** on site of the old one, where supplier, utility, and industrial user work as a team (**p 91**) . . . Operating savings justify Kansas G&E's system changes incidental to shutting down generators and putting old station on standby (**p 94**) . . . Computer calculations enable Pacific P&L to raise plant efficiency and make use of Lewis River hydro (**p 96**) . . . 480-v spot networks in 208-v network area save for Commonwealth Ed and its large customers (**p 105**) . . . Six-position, 230-kv zig-zag structure cuts costs of Sacramento Municipal substation (**p 110**).

Politics and Public Power

A CRACK IN THE WALL

A small, but definite crack finally appeared last week in the solid wall of co-op resistance against higher interest rates by the Rural Electrification Administration.

The Kentucky Statewide Cooperative Assn—composed of about 26 rural electric co-ops in that state—approved a resolution Sept. 29 in favor of paying a "fair cost of money due the U. S. Government on REA loans."

In addition, the statewide group called for its parent body, the National Rural Electric Cooperative Assn, to make a study to determine the cost, and for legislation to raise the interest rates to be introduced in Congress next year.

The resolution states:

"We realize that one of the most difficult points of criticism of the entire rural electric program derives from the interest rates on REA loans. We, therefore, feel duty bound to state our position on this controversial point.

"Our point is that we think we should pay the fair cost of money due the U. S. Government on REA loans.

"We urge that NRECA institute a study to ascertain this cost. As soon as the study is completed, we urge NRECA to submit proposed legislation for approval by the cooperatives requiring payment of the fair cost of money on REA loans.

"We further indicate our approval of this legislation to be presented to the Congress in its session beginning January, 1960."

NRECA is quick to point out, however, that (1) The Kentucky resolution comes from "only one state out of 46," and (2) Resolutions in favor of continuing the 2% REA

PROCUREMENT & PRODUCTS ▶ **Senate Anti-Monopoly Subcommittee gets explanation** of identical bidding from TVA purchasing officials . . . Post-steel strike business outlook is good, according to McGraw-Hill Economics Dept (p 126).

MANUFACTURERS ▶ **Westinghouse ships superpressure turbine** . . . New Preformed Line Products telemetering system measures stress (p 128) . . . Allis-Chalmers supplies 48 mercury-arc rectifier units for Reynolds Metals' aluminum plant at Massena, N. Y. (p 132).

NEW EQUIPMENT ▶ **Aluminum capacitor** racks are factory assembled . . . Three-stator meter with 200-amp capacity measures 4-wire wye service . . . Trailer houses purifying equipment for transformer and breaker oil (p 134).

MANAGEMENT ▶ **What does the working press think of your public relations?** This is a question worth asking yourself and your staff, based upon criticisms of utility public relations practice at the recent PIP Workshop Conference. For some tips on how to improve your PR techniques for better, more intelligent news coverage, turn to **page 149.**

SELLING ▶ **Electric heating warms school bus on winter mornings** . . . Saturday Evening Post's "Give Better Electrically" ad runs Nov. 21 (p 142).

interest rate have been enacted at all of the five annual meetings of NRECA regions held so far this fall. There are ten of these regions in all, composed of several states each.

NRECA region No. 3 (including the Kentucky group) won't hold its annual meeting until Oct. 29 in Biloxi, Miss., however, and this session could break the string of pat resolutions against changing the interest rate. At least, it could provide some genuine fireworks and argument on the subject.

There have been murmurings by co-ops in the Kentucky area for some time that they might be willing to pay a higher interest rate or change over to a different, "permanent" method of financing.

The important political significance of the recent Kentucky resolution is that the 2% interest level no longer can be claimed to be an indispensable part of the REA program. Once it is general knowledge that some co-ops can get along, or are willing to get along on a higher, fairer interest rate, then the much-used political harangue that 2% interest is essential to the REA movement will be outdated, and perhaps a more rational approach will be found to promote the financial needs of rural electrics.

Perhaps REA Administrator David Hamil's talk at the various regional meetings is finding a favorable response from more co-ops than NRECA would wish to admit. Hamil is telling them, "As long as you continue to insist that a more reasonable interest rate would ruin you, it will be difficult to convince the American people that rural electrification warrants their continued support. . . . We will eventually lose this support if we continue to insist stubbornly on a rate of interest which is below the going rate for money."

Smoke emission from older plants during load swings may be controlled by one or more of four approaches. For very old plants with special loading, an economical solution may be replacement of combustion equipment, furnaces and dust collectors. For middle-aged plants, a minimum of part-by-part modernization and modification may be the answer. Change of fuel or new operating methods or controls are other possibilities. Success of any approach lies in close cooperation between designers and operators. **"Stack-Emission Control during Power-Plant Cycling. J. F. McLaughlin, Jr, and G. W. Williams, Union Electric Co, ASME paper 59-SA-28.**

Will an engineer be the "boss" in utility management in the next 10-20 years? Any engineer who hopes to exercise the "coordinating function of engineering" at top management level should meet these qualifications: Be familiar with several fields of science and engineering; have the "sense" of applying science to situations; recognize construction and operating feasibility; appreciate economic and personality values; and know how to use the various means of communicating with people. **J. Harold Foote, president, AIEE, National Power Conference.**

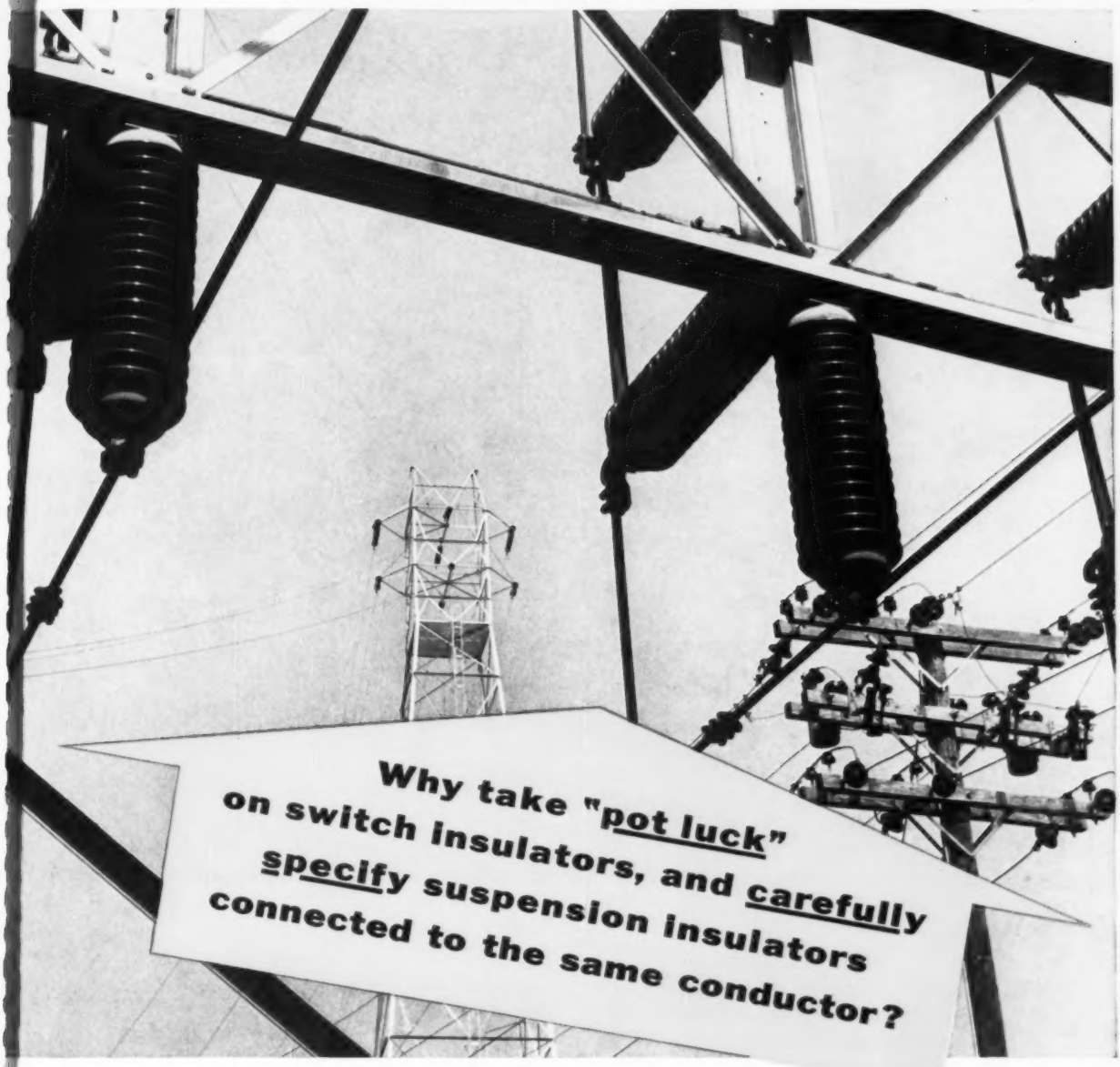
Comparison of conventional power cost with the estimated cost of nuclear power, for military installations that would require new generating capacity of 5,000 to 40,000 kw between 1963 and 1970, is being investigated. Kaiser Engineers will make the study for AEC at an estimated cost of $515,000.

Documents on the production of heavy water declassified in 1956, but held up since then by litigation, are finally being made public by AEC. They comprise 120 documents on the dual temperature hydrogen-sulfide exchange process. The commission sells heavy water today for $28 a pound in quantities of 125 pounds or more.

A new quarterly "Nuclear Safety" has been added to AEC's Technical Progress Review Series as a means of summarizing current developments in reactor safety. It's available from the GPO at $2 a year.

Final stage design and fabrication of a sodium-to-sodium heat exchanger and a sodium-to-water generator has been contracted to ALCO Products by AEC for $1,565,000. It follows up preliminary design of heat exchanger components for sodium cooled nuclear power plants assigned to ALCO in 1958.

What's the difference?



Careful thought was given the selection of suspension insulators for this river crossing. Why should insulators only a few hundred feet away -- connected to the same set of conductors -- equally capable of making trouble -- be bought on the basis of "pot luck."

This is what happens when switches are purchased without any expressed preference for make of insulation. Switchgear manufacturers are willing and able to furnish any insulator of your choice. It costs you no more in dollars or trouble. The service is yours for the asking.

Go into your own performance records, gathered on your own terms, and you will probably find the lowest rate of depreciation and the fewest cases of trouble with O-B. It's easy to put O-B insulation on any switch you buy. Just name it and you can have it!

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4930-H1

Ingenious pothead design

Here's the principle - greatly simplified - of O-B's Stress Cone
O-B develops new technique to obtain true shape of vital stress cone

The electrical stress cone of a high voltage pothead -- one of its most vital components - - has depended, in the past, on somewhat "primitive" methods. In O-B's new capacitor graded pothead, this important part has at last yielded to adroit design.

Permanently attached to the paper buildup is a narrow foil strip, set at a slight angle. Wrapping of this buildup generates a stress cone having a smoothly-formed helical shape of predetermined logarithmic conformation. Furthermore, this highly refined version of a stress cone is produced under completely controlled conditions, as a by-product of installing the factory-made buildup.

Many other parts show equally ingenious design. These new O-B potheads are applicable to any type of cable, presently in the range of 115 to 230 kv.

If you contemplate the use of underground cable, be sure to investigate this new O-B terminal equipment. Discuss it with your O-B representative, or write us direct.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4930-H2

"The most" arrester

Seems almost impossible -- it *has been* 'til now -- that a Distribution Class lightning arrester will exceed by almost three times the ASA Standard low-current, long-duration durability test prescribed for the heavy duty Station Class. Thorex Type DV routinely withstands 20 applications, in 6½ minutes (one-tenth the required time), of over 400 amperes, for 2,000 microseconds.*

Does this have any more than "conversational" value? In districts of 30 annual storm days, for example, reliable statistics record an average of one lightning stroke per year, per mile of line. Distribution circuits usually do not have the protection of an overhead shield wire.

Every lightning stroke contains some component of low-current, long-duration wave form -- at times, very severe.

Maximum service continuity of most Distribution circuits logically calls for lightning arresters of high durability characteristics. These are found, today, only in the Thorex Dynagap Type DV. This "extra" is yours without extra cost. Specify these arresters on new distribution transformers, and install them on new poletop construction.

* Station Class: 150 amperes, 2,000 microseconds, applied 20 times in a total of 75 minutes.

OHIO BRASS COMPANY, MANSFIELD, OHIO

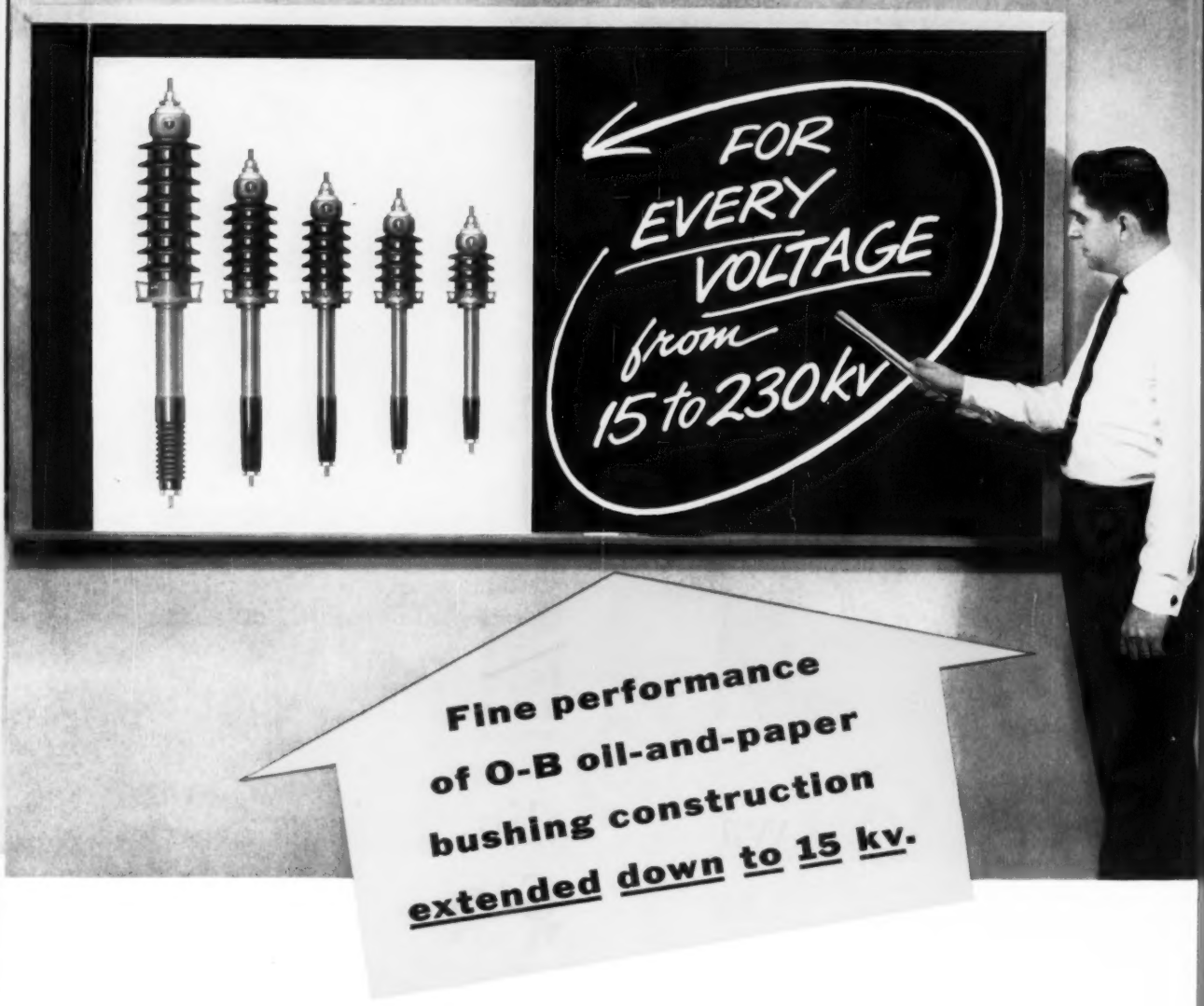
Ohio Brass

HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4930-H3

Now–for any voltage



Fine performance of O-B oil-and-paper bushing construction extended down to 15 kv.

You can have O-B Class GK (oil-and-paper) bushing construction, today, for any operating voltage between 15 and 230 kv. The best bushing we have made in nearly 50 successful years has now been extended into the voltage range below 69 kv.

High interchangeability -- exceptional mechanical strength in circuit breaker service -- many exclusive manufacturing safeguards -- are only a few of the extra values this bushing has to offer.

O-B's new "Table 2"* bushings are yours just for the asking. They can be supplied on any new station apparatus. Simply express your preference for O-B, and you will have a share in the industry's finest performance record.

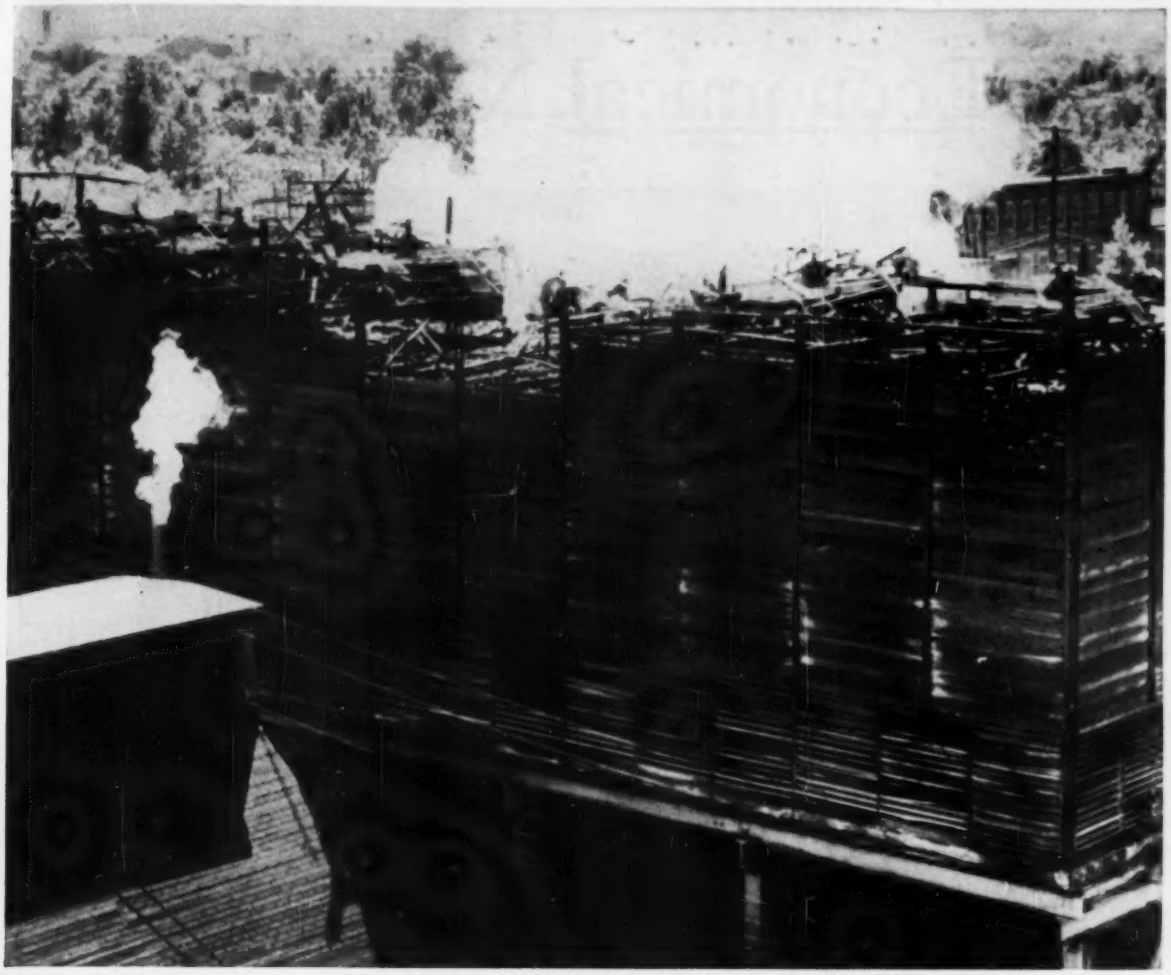
*See Table 2, ASA Bushing Standard C76.1a — 1958.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4930-H4



Fire caused by friction spark destroyed top 6 feet of this cooling tower, severely damaging motors, shafts and gear boxes.

Protect your water cooling tower from crippling fire with a Grinnell System!

Water cooling towers are essential in many industries today. But cooling towers can, and do, *burn*! Furthermore, fire may strike when the tower not only is shut down, *but even while it is in use*. One insurance company has stated that nearly half its losses involving towers occurred when the towers were in operation!

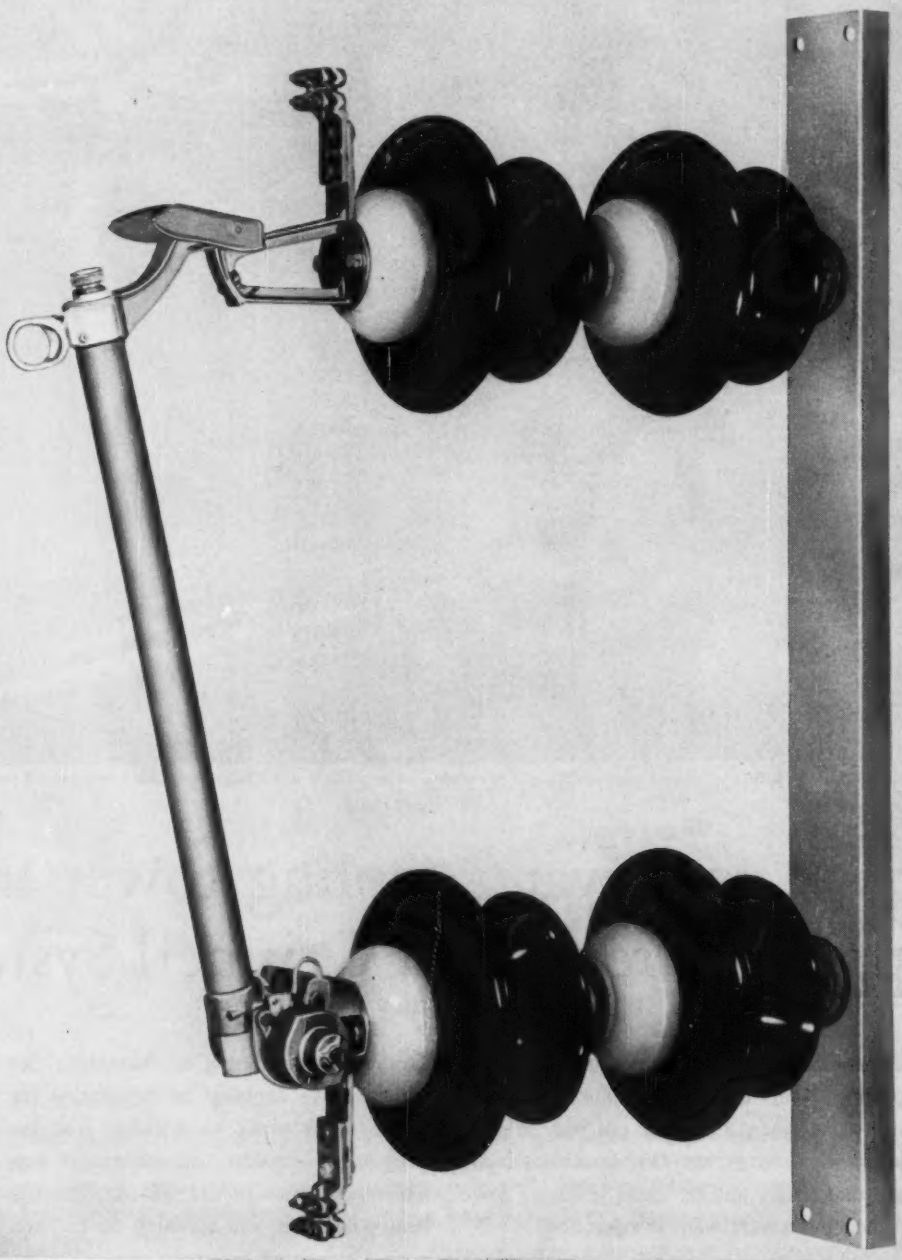
Why are cooling towers so vulnerable to fire? Because they are largely made of wood. It is true that when the tower is operating most of the wood is wet. But roof and sides can become excessively dry through exposure to the sun. Also, there is a portion of the tower above the cooling water distribution system that is never wet.

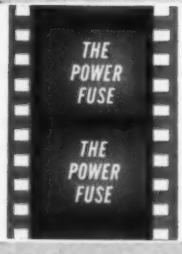
Your best protection against an unexpected blaze is a Grinnell Water Spray or Automatic Sprinkler System. Grinnell will engineer an installation for you that will protect your tower — possibly your entire production program — against fire, no matter how it may start. Common causes of fire include defective wiring, overheated bearings, and lightning. So call in a Grinnell engineer. Let him analyze your needs. Remember, he is well qualified to help you . . . backed by a company with 89 years experience in the fire protection field. Grinnell Company, Providence 1, Rhode Island.

GRINNELL

Fire Protection Systems Since 1870

An Economical New Family of





New full color sound movie on power fuses now available to any interested activity

Here is the dramatic story of the Power Fuse told in 25 minutes, including animated illustrations, actual field tests, and engineering data. Factual, up-to-date, informative. For a private showing, contact your Southern States representative or write direct to the company. (16 mm, color, sound.)

Power Fuses by Southern States

- LOW INITIAL COST—LOW RE-FUSING COST
- INTERCHANGEABLE FUSE HOLDERS
- WIDEST SELECTION OF RATINGS
- SIMPLIFIED CONSTRUCTION

Engineers charged with the dual responsibility of adequate system protection at minimum cost will welcome this new family of Southern States Power Fuses—the greatest development in years!

The simplified design and construction of these powerful, reliable fuses result in immediate savings on initial costs, when compared with most other types.

Re-fusing in the field results in remarkable savings: For example, at 69 kv a comparative cost for re-fusing a 3-phase installation shows a price differential ranging as high as $422.00. Higher voltages reflect even greater savings.

When system demands increase, and higher ratings are needed, it is a simple matter to change fuse holders—using existing mountings—and thus reap additional savings.

The costly practice of applying a fuse with excessive interrupting capacity is no longer necessary. The widest possible selection of fuses in this new Southern States family permits fusing to meet exact requirements. Substantial savings, without sacrifice, can be made here!

With interrupting ratings approaching 3½ million kva at 161 kv, it will pay everyone concerned with power fuses to investigate this new family of power fuses. Contact your Southern States representative, or write direct for Technical Bulletin 59PF.

COMPLETE FUSE KITS AVAILABLE

Clearly marked fuse kits are available at low cost for re-fusing Southern States Power Fuses *in the field*, easily and quickly. All components are sealed in moisture-free polyethylene bags. Kits are available in four speed ratios: PF (slow speed), PM (medium speed), PX (fast speed) and EEI-NEMA Type PE. Time-current characteristic curves are available for all fuses.

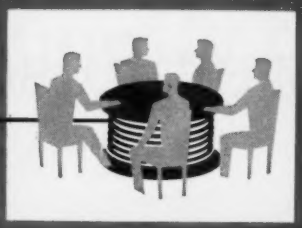
PIONEERS IN POWER FUSES SINCE 1924

SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

DU PONT

WIRE AND CABLE ROUND TABLE



You have asked . . .

Q: Someone recently told me that polyethylene has been used for over twenty years in cable construction. Could this be true?

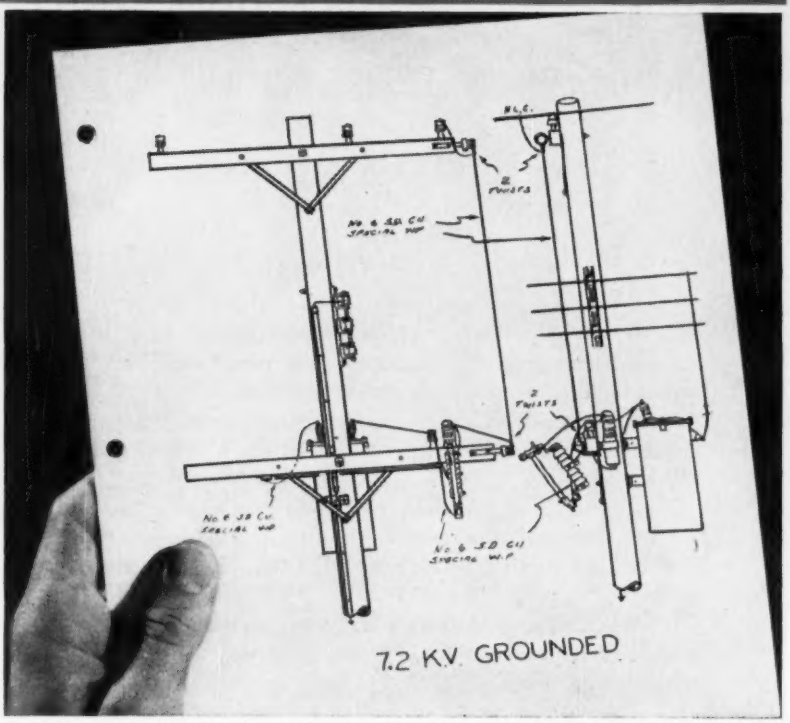
A: Yes, it is. Du Pont was the first company to distribute polyethylene in the United States, in the spring of 1939. This was done to test its acceptability and marketing possibilities. Polyethylene was first used as electrical insulation in 1939, when a coaxial cable was installed between Baltimore and Washington. Polyethylene's record during the war is well known.

Q: When referring to polyethylene what is meant by high density, high pressure, Ziegler, etc.?

A: Very simply, high-density polyethylenes have long chains of molecules with few branches. Those available commercially are manufactured by low-pressure processes, some of which use a so-called Ziegler catalyst (named after Dr. Karl Ziegler, of Germany, who was one of the pioneers in the use of particular catalysts at low pressures). Low-density polyethylenes have molecules with many long and short branches. They are usually manufactured by a high-pressure process.

However, the terms "high-pressure" and "low-pressure" have little meaning to a user of wire and cable, since they refer to the process by which the polyethylene was manufactured rather than the physical properties which result. Your purposes might be better served by referring to polyethylene by its various properties, such as corona resistance, stress crack resistance, etc. Your wire and cable supplier can best determine which type of polyethylene will meet your requirements.

Du Pont does not manufacture wire and cable, but supplies thermoplastic resins for insulation and jacketing.



Typical method for framing single-phase-transformer installations with riser wire jacketed with Du Pont ALATHON 4-BK30 polyethylene resin.

ALATHON® meets six rigid requirements of Georgia Power for transformer riser wire

When Georgia Power Co., of Atlanta, Ga., was looking for an improved jacket for their transformer riser wire, they demanded six important qualities:

- Good dielectric properties
- Good weathering qualities
- Excellent abrasion resistance
- High strength and toughness
- Resistance to cold flow
- Resistance to stress cracking

The Southwire Co., of Carrollton, Ga., came up with the answer, a jacket of Du Pont ALATHON 4-BK30 polyethylene resin. This high-molecular-weight weatherproof compound meets all the requirements for use on primary distribution circuits ranging from 4KV to 13.2KV.

The jacket of ALATHON also provides an extra margin of safety against accidents such as the riser contacting the secondary service wires. And despite the thickness of the jacket (110 mils), the covered wire is still flexible and easy to handle.

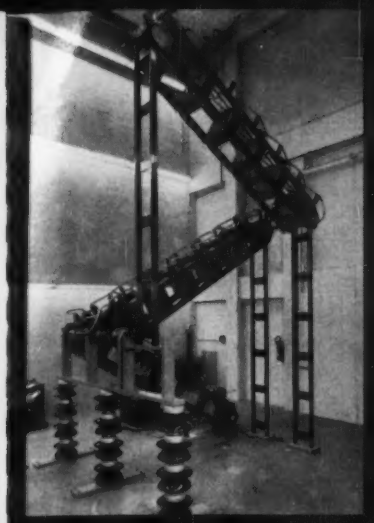
For information on how ALATHON can solve your insulating and jacketing problems, write to your wire and cable manufacturer or E. I. du Pont de Nemours & Co. (Inc.), Department M-1012, Room N-2507A, Nemours Building, Wilmington 98, Del.

POLYCHEMICALS DEPARTMENT

DU PONT

Better Things for Better Living . . . *through Chemistry*

ALATHON® POLYETHYLENE RESINS | **RULAN®** FLAME-RETARDANT PLASTICS | **ZYTEL®** NYLON RESINS



JOSLYN EXPANDS ELECTRICAL LABORATORY

KEEPING PACE WITH ELECTRICAL PROGRESS

The unique Multi-Purpose, Joslyn-Designed Impulse Generator is illustrated at the upper left. In the extended position as shown, the generator can deliver standard impulse voltage waves up to 1,800,000 volts. By folding the generator so that the three capacitor banks are parallel to each other, fast rates of current rise as high as 40,000 amperes per microsecond may be obtained. Also, with the insertion of proper coils and resistors, a low-current, long-duration surge current (up to 300 amperes, 3,000 microseconds long) for testing valve-type lightning arresters may be obtained.

At the upper right, the Surge Current Generator used for testing the ability of protective equipment to cope with lightning discharges is shown. This generator will deliver as much as 125,000 amperes (crest) at 150,000 volts.

In the center, there is a view of the Control Room which includes all the necessary modern equipment for measuring the electrical performance of Joslyn products.

At the lower left, the High-Current, 60-Cycle Power Generator with its 1,000-horsepower Driving Motor is illustrated. The mechanical stored energy in the 41-ton rotating generator field can be converted momentarily to more than 300,000 kva of electrical energy for testing circuit-interrupting devices.

The specially designed Test Transformer supplied by the High-Current, 60-Cycle Power Generator is shown at the lower right. The many bushings on the cover permit external winding connections for obtaining any test voltage up to 72,000 volts.

LIVE BETTER ELECTRICALLY

JOSLYN COMPLETE POLE LINE EQUIPMENT ®

Continuing Research and Development toward the goal of Better Products is why we have been - - -

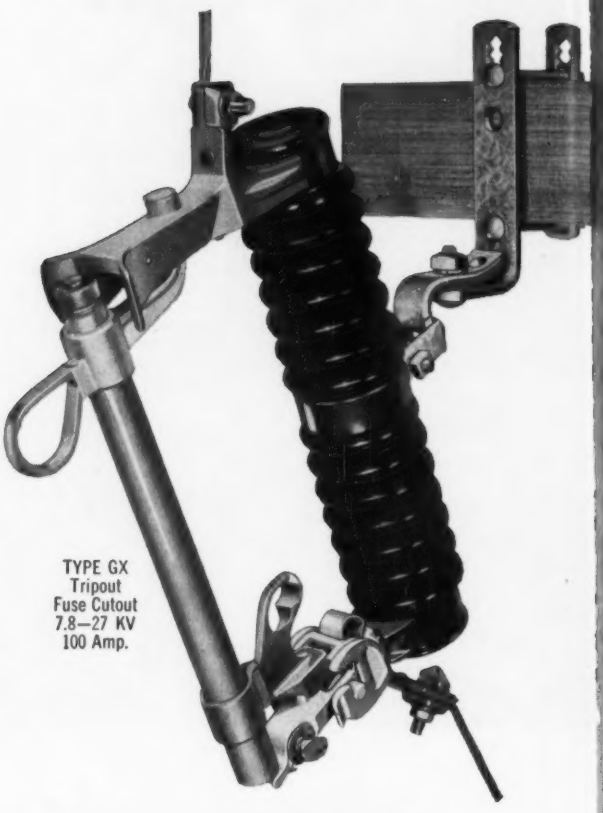
paralleling electrical progress for 56 years!

JOSLYN MFG. AND SUPPLY CO.

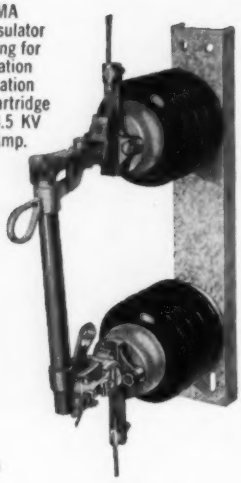
155 North Wacker Drive · Chicago 6, Illinois

KEARNEY

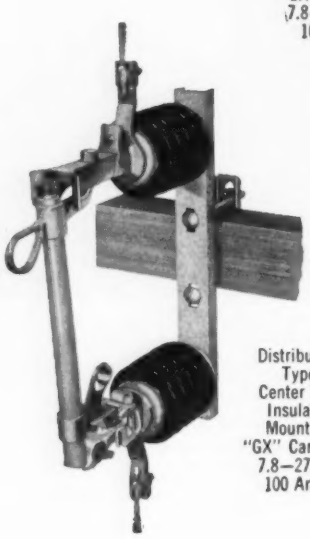
KEARNEY "G" and "GX"



TYPE GX
Tripout
Fuse Cutout
7.8—27 KV
100 Amp.



NEMA
Post Insulator
Mounting for
Substation
Installation
"GX" Cartridge
7.8—34.5 KV
100 Amp.

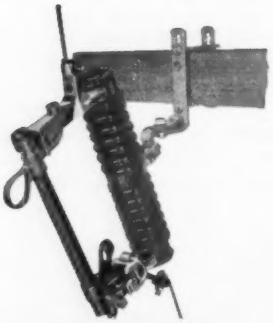


Distribution
Type
Center Bolt
Insulator
Mounting
"GX" Cartridge
7.8—27 KV
100 Amp.

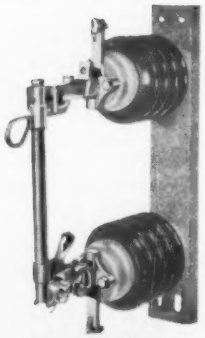
Type "GX" Cartridges vent at bottom only on low-amperage faults . . . at both ends on high fault currents. Both vents are in line with axis of tube, reducing shock recoil to a minimum. On high amperage faults, top venting action blows small disk out of expendable cap to safely relieve gas pressure.

UPDATE YOUR OLDER CUTOUTS WITH KEARNEY CONVERSION UNITS

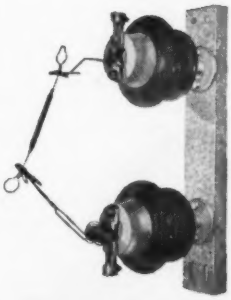
These modern current-carrying parts install on existing mountings to give you all of the outstanding features and performance of the newest Kearney Cutouts—positive dropout action, higher interrupting capacity, and extra strength fuse tubes.



Type G 5.2-15 KV
Type GX 7.8-15 KV



Type G and Type GX
7.8-34.5 KV



Trip-O-Link 50 Amp.
23-69 KV

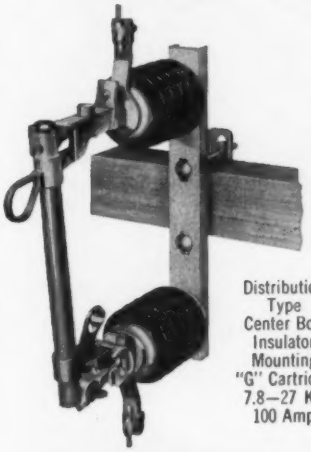
for better construction – safer maintenance – specify KEARNEY products

cutouts...

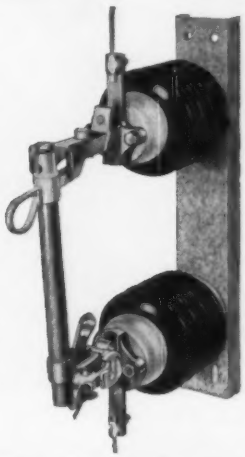
FOR DEPENDABLE, MODERN SYSTEM PROTECTION

Kearney Type "G" and "GX" Tripouts assure the highest level of operating dependability and economy for full range distribution system protection. Both interrupt fault currents ranging from minimum melting of the link to maximum rating of the cutout with any size button head link up to 100 amperes. A choice of venting is offered by two cartridge types, interchangeable in the same voltage ratings. Full-time double venting is provided by the "G"... and pressure-controlled double venting by the "GX." These two cartridges, and a wide range of interrupting ratings, voltages and mountings meet every operating requirement.

TYPE G
Tripout
Fuse Cutout
5.2—15 KV
100 Amp.



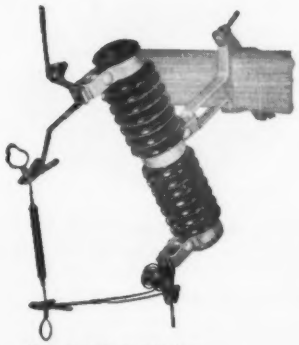
Distribution
Type
Center Bolt
Insulator
Mounting
"G" Cartridge
7.8—27 KV
100 Amp.



NEMA
Post Insulator
Mounting for
Substation
Installation
"G" Cartridge
7.8—34.5 KV
100 Amp.

Front vent directs expulsion gases away from line equipment. Gas pressure from top jet keeps cartridge in place and upper contacts closed until arc is extinguished. Size of top vent in double vented cartridge allows build-up of ample pressure to extinguish low amperage arcs, yet enables cartridge to withstand gas force of high current faults without rupturing.

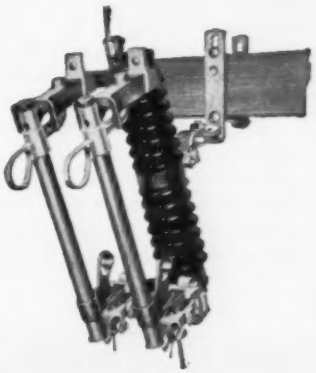
Heart of Type "G" construction is this full-floating constantly aligned upper contact, which cannot be misaligned by high current interruption or extreme side thrust during closing. During interruption, force of cartridge thrust is absorbed by full-floating contact until arc is extinguished and cartridge drops out.



Trip-O-Link 50-100 Amp.
5.2-15 KV

KEARNEY DUAL CARTRIDGE LOAD INTERRUPTER

Safe, positive way to interrupt load current. For full load sectionalizing or dropping transformer or capacitor banks. Current is interrupted electrically, not mechanically. During operation, one cartridge, fused for load protection, is closed in; the other, the interrupter, fused with a low amperage link, remains open. Later this cartridge is closed in, and service cartridge pulled out. After predetermined time delay, small link blows, interrupting current safely within interrupter cartridge.



JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue • St. Louis 10, Missouri

Plants at: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH AND CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

Another new development using

B.F.Goodrich Chemical *raw materials*

TOUGH JACKET OF GEON

protects direct burial wire

Direct burial wire made by Superior Cable Corporation with a jacket of Geon is also used for aerial constructions where burial is not practical. Geon vinyl materials are supplied by B.F.Goodrich Chemical Company.

Designed for use in outside buried plant, this wire must withstand severe mechanical and chemical stresses both during installation and service. That's why its jacket is made from Geon vinyl.

Geon is tough. Insulation compounds made from it are strong, abrasion-resistant and have excellent flexing properties. They resist flame, will not support combustion and are not affected by ordinary causes of corrosion—like oil, grease, chemicals or galvanic action. They retain these exceptional properties with age. They are lightweight, make wire easy to install or splice.

For more information about the many types of wire and cable covering made of Geon, write Dept. AT-9, B. F. Goodrich Chemical Co., 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

A TRADE MARK OF B.F.GOODRICH CHEMICAL COMPANY
Geon
VINYLS
A DIVISION OF THE B.F.GOODRICH COMPANY

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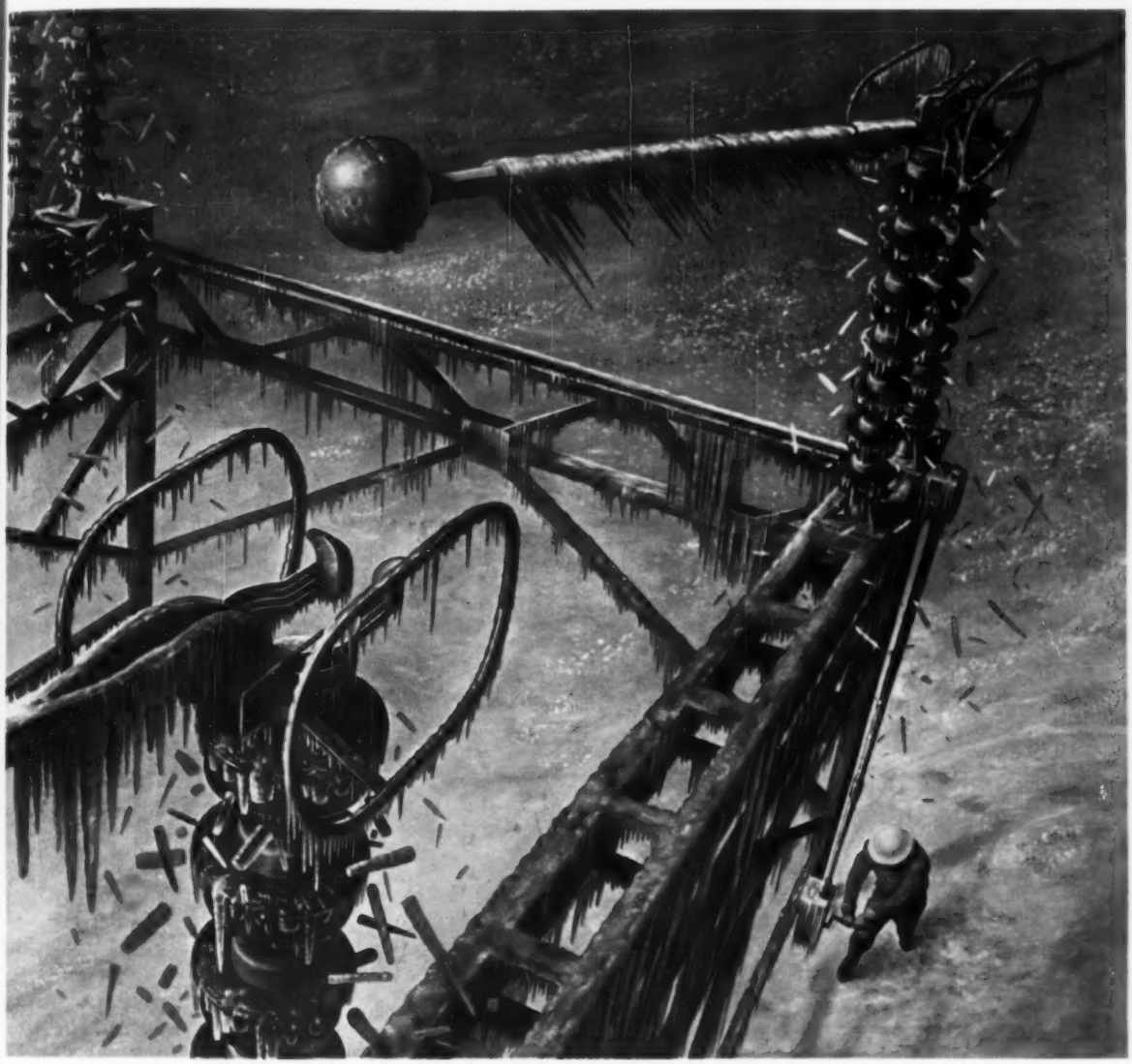
B.F.Goodrich

GEON polyvinyl materials • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers



Winter brings the menace of ice that power utility men dread. But I-T-E switches smash out with almost summertime ease. Here Ned Seidler paints the dramatic moment when the icy bonds are shattered.

SMASHES OUT OF INCH-THICK ICE TRAP

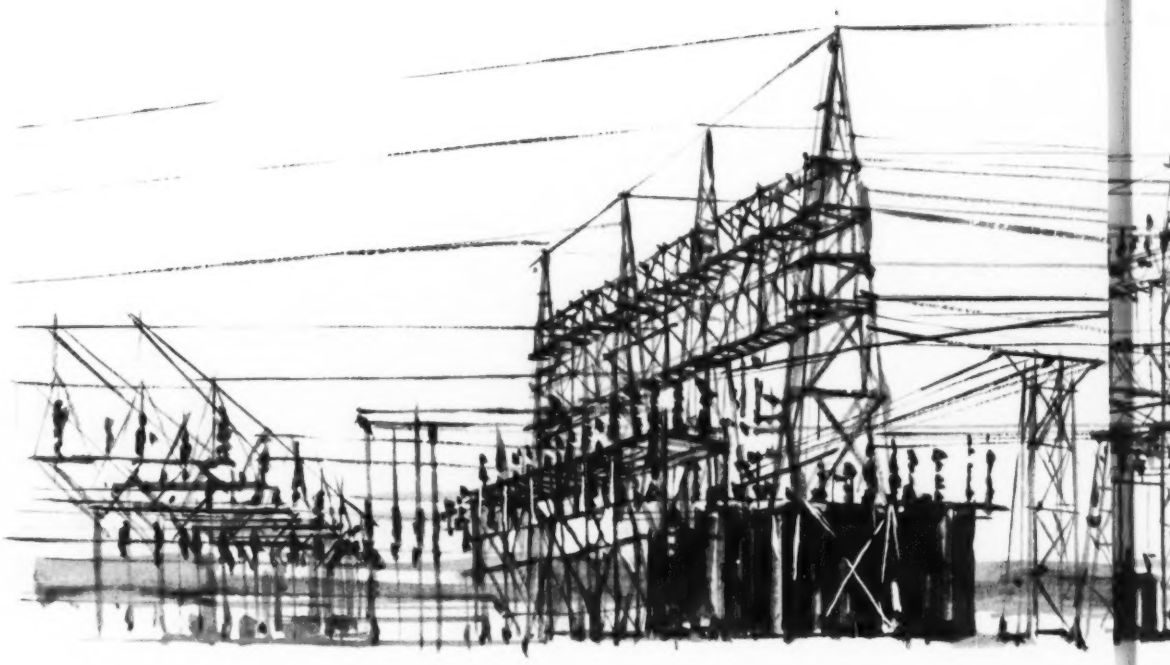
Even under an inch-thick blanket of hard ice, I-T-E high voltage air switches open with ease and safety—the result of countless design details.

Blades rotate completely free from the contact jaws before lifting begins . . . breaking out of the ice lock in the process. Rotating insulators turn easily on sealed, greaseless ball bearings. Shattered ice falls harmlessly aside, since there are no compression points in the entire switch. A child could open this switch . . . so little force is required. Yet the double protected, pressure-loaded hinge contacts insure high conductivity and high thermal capacity all the years the switch is in use.

Switches are available in ratings to 1470 BIL. Tests prove they have the lowest radio influence level in the field.

Turn page and see how other I-T-E products can help you too

I-T-E CIRCUIT BREAKER COMPANY

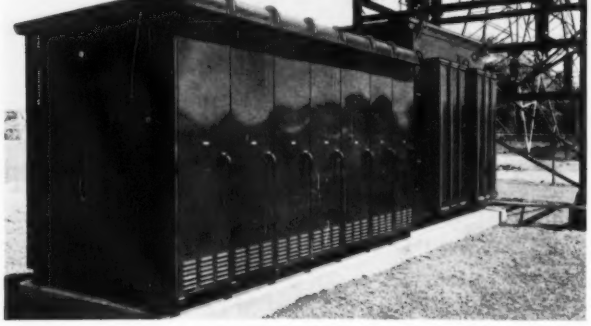


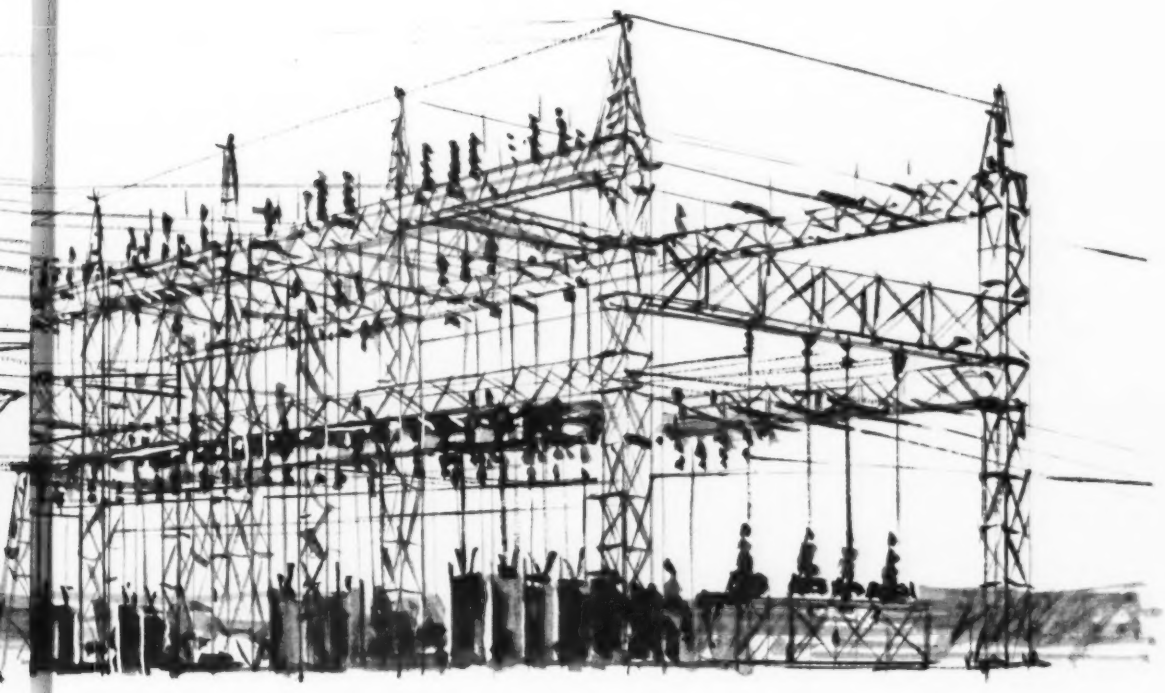
GET MORE FOR YOUR MONEY

THE BROAD I-T-E LINE GIVES YOU CONSISTENTLY H

Designed and built to meet your own requirements exactly. You pay no extra for I-T-E Primary Unit Substations, but you get custom designing and construction to meet your exact power, space and future expansion requirements. Standard components, skilfully selected from the broad I-T-E line, speed delivery and insure optimum quality. All parts are scheduled to arrive on time for early service use. Available in all standard kva ratings and secondary voltages up to 13.8 kv.

New, more compact secondary unit substations. Save space at your generating station. Now I-T-E secondary unit substations need less space than ever. K-LINE circuit breakers stack four high in ratings up to 600 amp. They save roughly one-third the space. In addition, you get these other K-LINE advantages: quick manual make closed door drawout; expanded range trip. Only I-T-E builds these substations in a single plant to give you better-coordinated engineering, manufacturing and delivery.

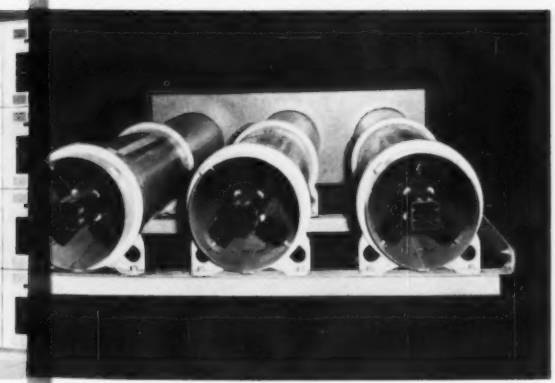




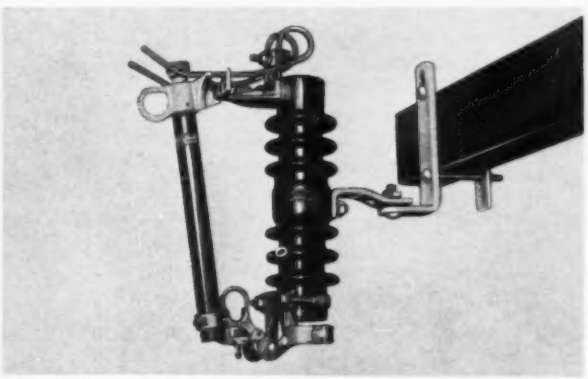
Efficient design and fast installation save you double. I-T-E outdoor substations have one particularly significant advantage over others. Structures are completely designed and fabricated in a single plant. I-T-E assumes complete responsibility . . . coordinates engineering and manufacturing every step of the way, from layout drawings and application of blade switching equipment to finished and carefully identified structural parts. Only I-T-E offers a background of 50 years' unified service. I-T-E introduced the all-aluminum utility substation structure in 1947.

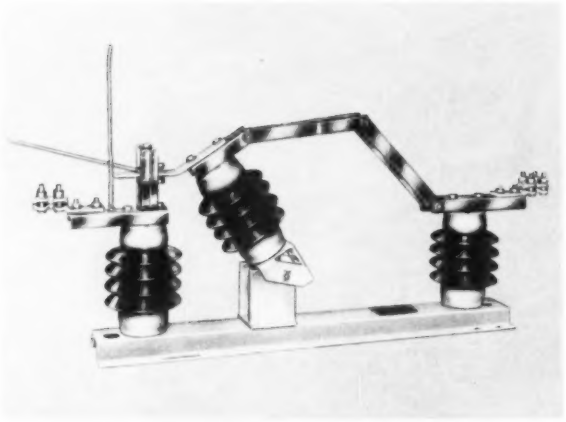
HIGHER QUALITY . . . COSTS NO MORE

Safer, more compact main bus. Not a single case of phase-to-phase short circuit has ever been reported on I-T-E Isolated Phase Bus since I-T-E introduced it 22 years ago. Such performance is proof of good design and consistently high-quality construction. I-T-E uses cylindrical enclosures for superior heat dissipation, easier gasketing, lower cover losses, better shape retention with internal pressure, and saving in weight. Ratings from 4.16 to 34.5 kv and through 20,000 amp.

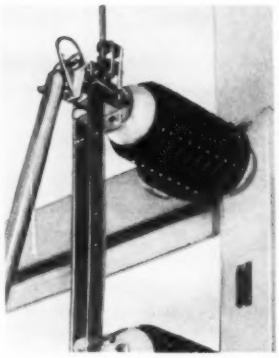


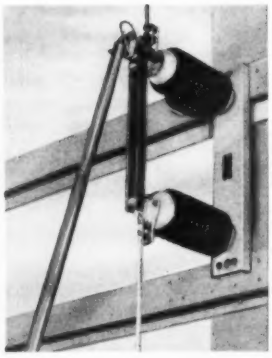
More of everything you want in a distribution cutout. Single basic design with choice of two fuse holders covers full range of NEMA standard ratings. Uses any standard NEMA fuse link. Expendable cap design provides optimum performance at low and medium fault currents, still maintains a large margin over rated maximum interrupting ability. Cutout converts easily from open to load-break type. Mechanical interlock gives lineman complete control of load break operation. Insulators 100% tested.





Shuntless tilting insulator switches. Notice the absence of corrosion-prone flexible braid on this I-T-E tilting insulator switch. Instead there's a durable current-carrying linkage with silver to copper contacts at each hinge point. Silver to copper is also used between the blade and jaw contacts. Pantograph is of hard-drawn copper that resists corrosion and gives longer life. Current rating can be increased with parts supplied in an easy-to-use conversion kit. Switch voltage ratings from 7.5 through 34.5 kv.





It tells you when it's shut. You never have to wonder if one of these new I-T-E hook-operated disconnecting switches is fully closed. It goes "snap" . . . out loud so you can hear it. In addition the extra-large latch members give you visual evidence too. Parallel blades are widely spaced and heavily braced for maximum rigidity. Roomy hook-stick eye and pryout motion in opening contribute to the easy operation of the switch. Ratings: 7.5 through 69 kv, 600 and 1200 amp; also made with tubular construction rated up to 161 kv, 3000 amp.

I-T-E Circuit Breaker Company U-6

1900 Hamilton St., Philadelphia 30, Pa.

- ☐ High voltage air switches
- ☐ Outdoor substation structures
- ☐ Primary unit substations
- ☐ Secondary unit sub-stations
- ☐ Isolated phase bus
- ☐ Distribution cutouts
- ☐ Tilting insulator switches
- ☐ Hook-operated switches
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)
- ☐ Power switching centers
- ☐ Molded case circuit breakers
- ☐ Other .....

Name .....Title .....

Company .....

Street .....

City .....Zone .....State .....

MAKE IT A HABIT!

Think of I-T-E whenever you buy electrical equipment. Detailed literature available on every product. Send coupon now.

I-T-E CIRCUIT BREAKER COMPANY

NEW EXPERIMENT IN TELEPHONY

It could speed up "dialing." Bell Laboratories people created it—and now it's being tested.

The telephone you see above embodies an important new concept. It "dials" by means of push buttons—promises more convenient telephoning. Bell System engineers are currently testing it for public reaction. Bell Telephone Laboratories developed it.

The Laboratories' invention of the transistor makes it possible. For the transistor permits a new kind of calling signal generator, mounted within the instrument.

To insure ease of operation, psychologists studied human reactions to various finger pressures and sizes and arrangements of buttons. All factors affecting speed and accuracy were thoroughly evaluated. Electrical and mechanical engineers brought together the human and physical factors, created a practical piece of apparatus. Industrial designers worked out the functional shape.

The new instrument sends a calling signal quite different from that of your present telephone. This poses a problem. Complex automatic switching must be changed to handle the new signals as well as the old ones. Switching engineers must devise ways to make this change in *thousands* of central offices—economically.

Most of the challenges have been met. Final judgment on this new concept depends on the outcome of field tests. Meanwhile, Bell Laboratories continues in its task of originating and developing devices to improve your Bell System telephone service.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

Out of Your Investment in Westinghouse Research Came a Great Advance in Network Transformers . . .

IN 1956 Westinghouse introduced the revolutionary Space-Miser network transformer—a compact design, 20% lighter in weight, that enabled utilities to save 15% in vault space for a given kva rating.

IN 1957 the Space-Miser design established itself as pacesetter of the industry.

IN 1958 as the rest of the industry rushed to match the new standards in economy, reliability and maintenance made possible by this new unit, Westinghouse extended Space-Miser design to the full range of EEI-NEMA ratings.

IN 1959 Westinghouse has continued to set the pace with refinements in Space-Miser tank design and by adding the exclusive Insuldur* insulation system.

FOR OVER THREE YEARS Space-Miser design has set the pace for industry progress with resulting benefit for every utility network system. This is a clear-cut example of how electric utilities' dollars, spent with Westinghouse, have reaped research and development dividends in increasingly efficient equipment.

For more information, contact your Westinghouse representative . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-70903

*Trade-Mark

SPACE MISER the network transformer that changed the thinking of an industry

SPACE-MISER NETWORK TRANSFORMERS changed industry thinking in . . .

Maintenance Savings—Smooth-Form tank and Yukon coolers permit more uniform finish, simplify inspection and repainting, and reduce collection of corrosive deposits.

Installation Savings—Small size and light weight make handling easier, faster, safer. Required vault space is smaller. In addition, low height permits off-the-floor mounting without extra-cost excessive vault depth.

Improved Reliability—Insuldur insulation system permits 10° more overload temperature without additional loss of insulation life. Other features which boost reliability include superior design bushings, rotary disconnect and grounding switch and easily accessible high-voltage terminal chamber.

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

NEW UTILITY STATIONS, C-E EQUIPPED

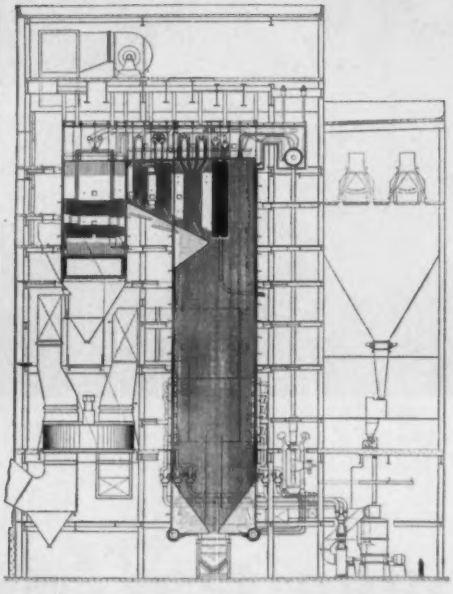
Includes only new stations on new sites placed in operation since JANUARY 1, 1950.

LAKE CATHERINE
HUTCHISON
YATES
DUNKIRK
TITUS
LEE
CONTRA COSTA
HAWTHORN
NINEMILE POINT
EDGE MOOR
PALATKA
JOHNSONVILLE
DANSKAMMER
BECKJORD
HIGHGROVE
PLANT X
BLACK DOG
ALBANY
JOPPA
MERAMEC
PORTSMOUTH
LAKE CREEK
ETIWANDA
AURORA
HENNEPIN
EASTLAKE
OAK CREEK
SUWANNEE RIVER
URQUHART
KINGSTON
SANDOW
MULLERGREN
BARRY
NORTH OMAHA
WILMINGTON
CARBON
SAGUARO
MORRO BAY
VERMILION
JOHN SEVIER
COLLIN
MILLIKEN
GALLATIN
BARRETT
MITCHELL
SAN BERNARDINO
YORKTOWN
GULF COAST
TUCSON
PORT WENTWORTH
W. A. PARISH
ALLEN
MONTROSE
McMEEKIN
LEWIS and CLARK
ROY S. NELSON
YUMA AXIS
DICKERSON

DAN E. KARN

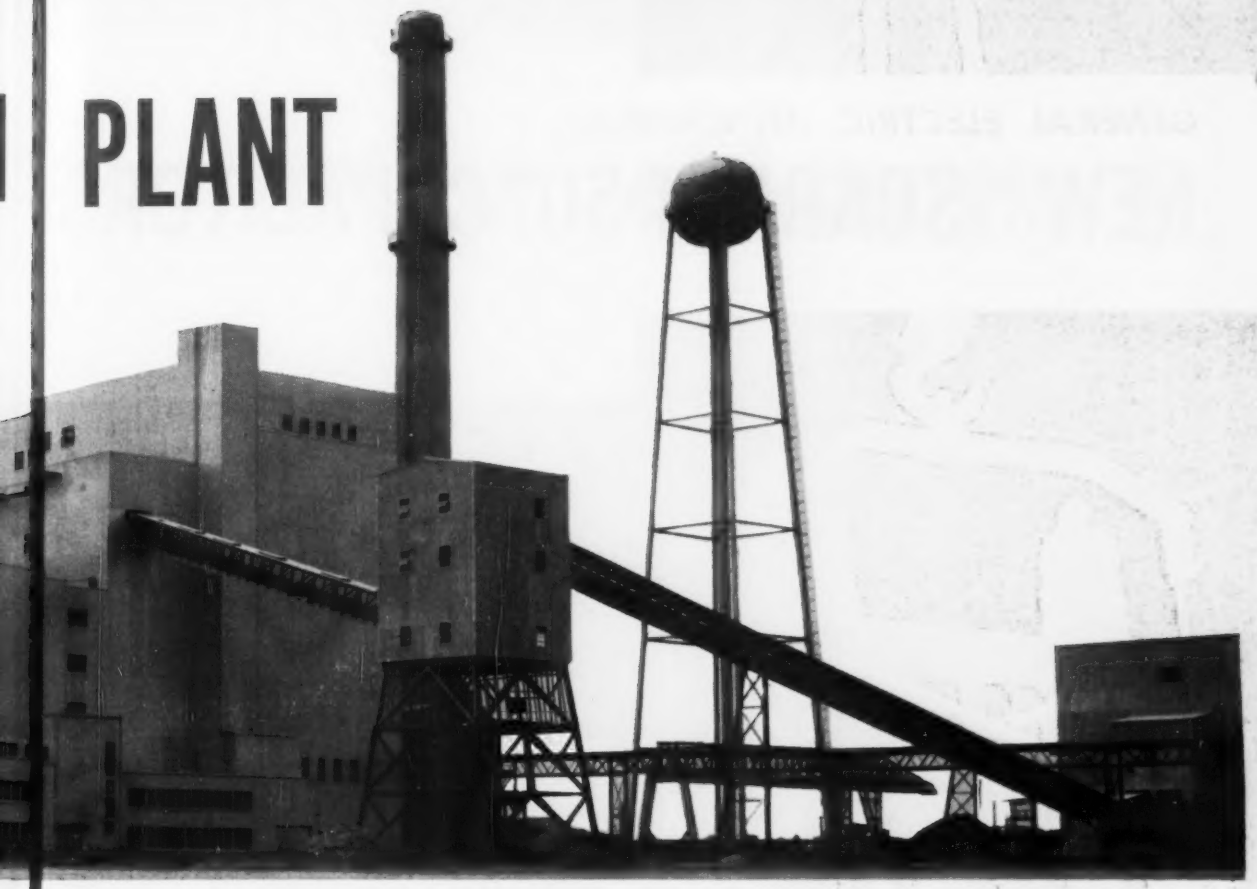
NEW DAN E. KARN

Goes into Service



This C-E Unit is now in service at the Dan E. Karn Plant. It is of the controlled circulation, radiant reheat type with twin furnace arrangement. The reheater section is located between the primary and secondary superheater surfaces. An economizer section is located below the primary superheater in the rear pass and regenerative type air heaters follow the economizer surface. This boiler is pulverized coal fired using bowl mills and tilting, tangential burners.

PLANT



Consumers Power Company recently put into operation Unit No. 1 at its new Dan E. Karn Plant located in Essexville, Michigan, on Saginaw Bay. This first Karn unit, rated at 265,000 kilowatts, represents a departure for Consumers Power Company from tandem-compound machines to the cross-compound type. Employing a throttle pressure of 2400 psig at 1050 F, reheated to 1050 F, this unit is expected to be the most efficient producer of power on the entire system. Commonwealth Associates, Inc. are the consulting engineers.

The Karn Plant is located close to the company's present John C. Weadock Plant for reasons of economy associated with a variety of factors, including such importantly related ones as coal delivery and coal handling, proximity to important load centers, availability of line exits, abundant cooling water and coordinated plant supervision.

Steam for the new unit at the Dan E. Karn Plant is supplied by a C-E Controlled Circulation Twin-Furnace Boiler, a cross-sectional elevation and brief description of which appears on the opposite page.

COMBUSTION ENGINEERING

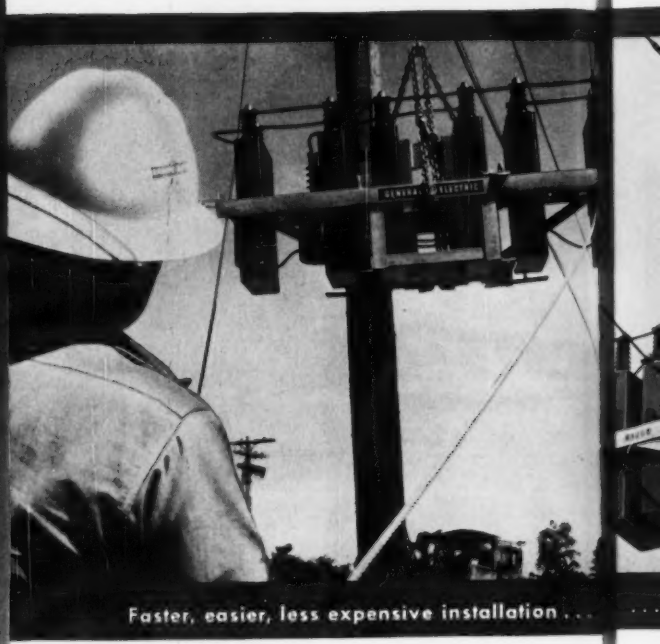
Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

C-243

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

GENERAL ELECTRIC ANNOUNCES

NEW "ISOKRAFT 50" CAPACITORS S



Faster, easier, less expensive installation . . .

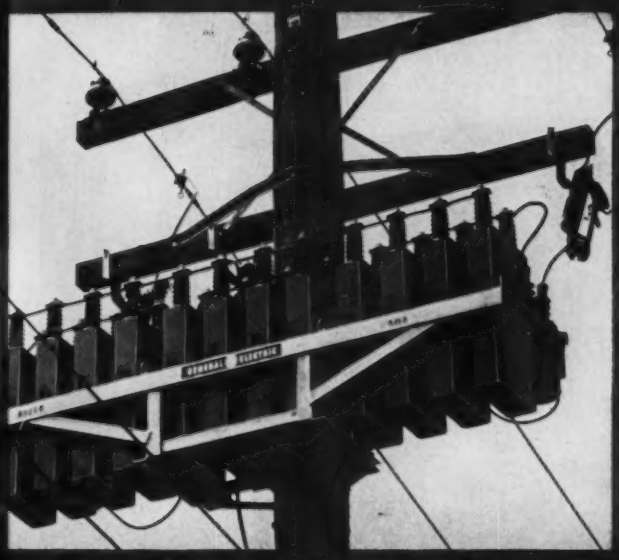
NEW "ISOKRAFT 50" CAPACITORS PERMIT

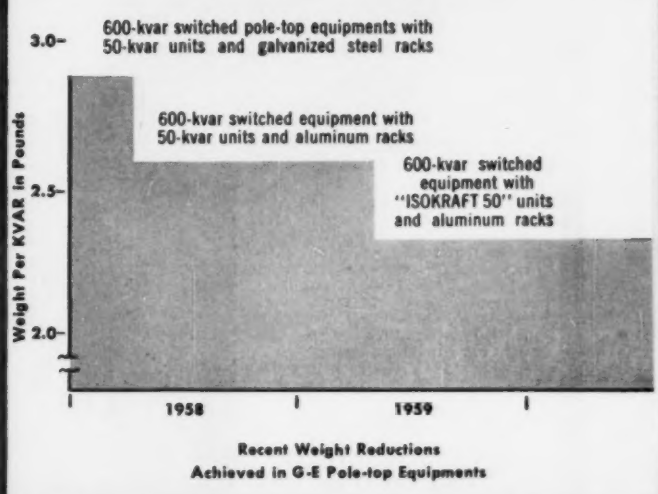
- More KVAR per pole
- Easier installation

***14% lighter than previous General Electric units**

†Trade-mark of General Electric Co.

SMALLER AND 14% LIGHTER*




3.0–
2.5–
2.0–
Weight Per KVAR in Pounds
600-kvar switched pole-top equipments with 50-kvar units and galvanized steel racks
600-kvar switched equipment with 50-kvar units and aluminum racks
600-kvar switched equipment with "ISOKRAFT 50" units and aluminum racks
1958
1959
Recent Weight Reductions Achieved in G-E Pole-top Equipments

. . . 600-kvar equipment at 450-kvar weight are . . . . . benefits of General Electric capacitor progress.

General Electric's new "ISOKRAFT 50" capacitor weighs less than 2 pounds per kilovar, LIGHTEST 50-KVAR CAPACITOR ON THE MARKET TODAY. Lighter weight and smaller size make "ISOKRAFT 50" capacitors easier to handle and permit more kilovars per pole.

14% WEIGHT REDUCTION results from new ISOKRAFT† paper dielectric, combined with improved internal construction and manufacturing methods. New 600-kvar equipments with aluminum racks now weigh no more than older 450-kvar equipments with galvanized steel racks and heavier units. With "ISOKRAFT 50" stainless-steel case units, the new General Electric equipment permits faster, easier, less expensive installation.

GREATER RELIABILITY—Lower temperature rise and increased ability to withstand lightning and switching surges contribute to a more reliable capacitor unit.

Check to see how General Electric's new "ISOKRAFT 50" capacitors can benefit your system.

FOR COMPLETE INFORMATION, write for bulletin GEA-6990—Section 445-29, General Electric Co., Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Another way RCA serves business through electronics
"Two years ago it became apparent we needed electronic data processing, but our studies indicated that a giant computer was not practical. We wanted a system small enough to fit into our over-all program to streamline accounting procedures, yet potentially large enough to keep up with our expanding operations."
—GEORGE J. BRETT,
Vice President and Controller
NIAGARA MOHAWK
POWER CORPORATION
Mr. George J. Brett, photo left, discusses the RCA 501 with Mr. Harold E. Steiner, Assistant Controller, photo right.

"Two years of study gave us every reason we needed for choosing the RCA 501!"

One reason for Niagara Mohawk's choice was cost savings, both initially and in operation. Another was system flexibility. The RCA 501 not only gives more work for the data processing dollar, its size can always be controlled to fit the size of the job.

The full-function facilities of the RCA 501 can handle a tremendous load of paperwork. Initially, the Niagara Mohawk system will be used primarily for computing monthly utility bills for 1,300,000 customers. The RCA 501 will handle the enormous number of calculations required in a matter of hours.

For further information or to arrange for a visit to the RCA Electronic Data Processing Service Center, write Radio Corporation of America, Electronic Data Processing Division, Camden 2, New Jersey.

At the world's most modern Electronic Data Processing Center in the RCA-Cherry Hill plant near Camden, N.J., the RCA 501 may be seen in full-scale operation serving business, industry and government.

RCA 501 Electronic Data Processing System

RADIO CORPORATION of AMERICA

ELECTRONIC DATA PROCESSING DIVISION • CAMDEN 2, N. J.

Tmk(s) ®

SOMETHING NEW UP IN THE BLUE!

ONE-PIECE SPACER DESIGN— NO MOVING OR MATING PARTS:

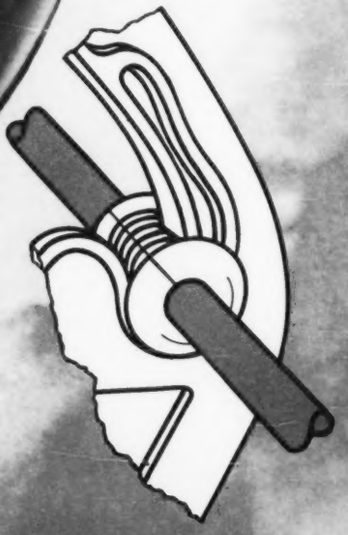
This design helps you in two ways:

(1) Smooth body permits self-washing . . . crevices that collect arc-causing contaminants are *eliminated*.

(2) The spacer is easy to install . . . no special line crews are necessary.

A lock ring securely fastens the spacer at the bottom. Once put in place and the phase conductor inserted, the lock ring is permanently attached.

Grommets are slit for easy application to individual conductors. Available in a number of sizes to fit any phase conductor or messenger diameter for 5-15KV systems.



COMPRESSION RINGS ON GROMMETS PREVENT "TRAVELING" ON THE LINES

An exclusive feature! Trimline's grommets have built-in compression rings to assure a snug cable-to-spacer fit. The proper distance between spacers is always maintained, because grommets prevent spacer from traveling.

ROME

TRIMLINE

ROME

TRIMLINE

PRIMARY DISTRIBUTION SYSTEM

NOW YOU CAN HAVE A MODERN AERIAL SYSTEM AT A MODEST COST!

Now spacer-type installations can be as *reliable* as they are *practical!*

This unique spacer design does it – part of the new Rome TRIMLINE Primary Distribution System! *There is no other spacer quite like it:*

It's all one piece – there are no cracks or crevices in which moisture or contaminants might collect to cause arcing.

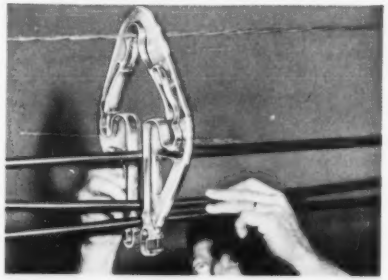
No nuts or bolts or special tools needed to install it. Even untrained personnel can do the job quickly.

Spacer completely encloses phase conductors and messenger to provide an extra measure of protection against storm damage.

You can use a TRIMLINE system to gain these advantages:

1. Reduces tree-trimming costs in bad tree areas.
2. Provides storm-damage protection not provided by open-wire systems.
3. One spacer accommodates systems of up to 15KV.
4. Eliminates the need for additional crossarms.
5. Provides a positive means of phase identification.
6. Can be easily tapped and spliced.
7. Provides excellent voltage regulation due to lower reactance.
8. Phases can be easily added or removed.
9. Neat, trim appearance for residential areas.
10. Ease of maintenance.

INSTALLS IN A JIFFY...WITHOUT NUTS AND BOLTS!

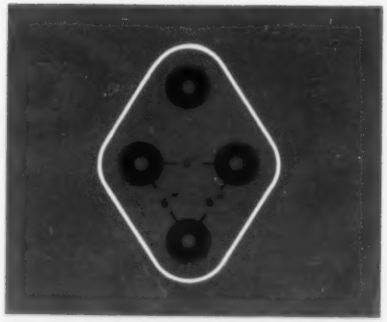


COLLECT conductors inside spacer.

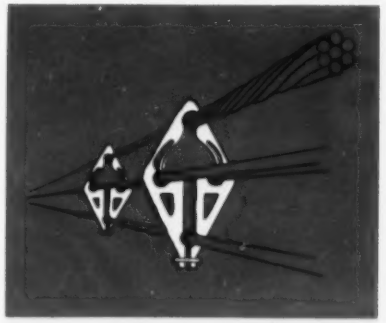
CLAMP it shut with lock ring. No nuts or bolts to slow you down!

CLICK conductors (with grommets) in place – just a tug locks them tight!

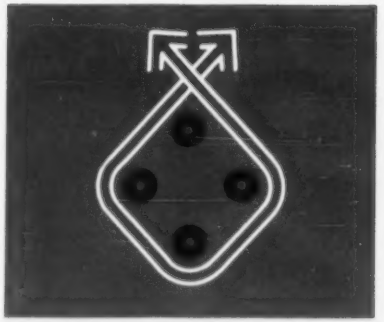
SEE HOW TRIMLINE SPACERS PROTECT YOUR SYSTEM



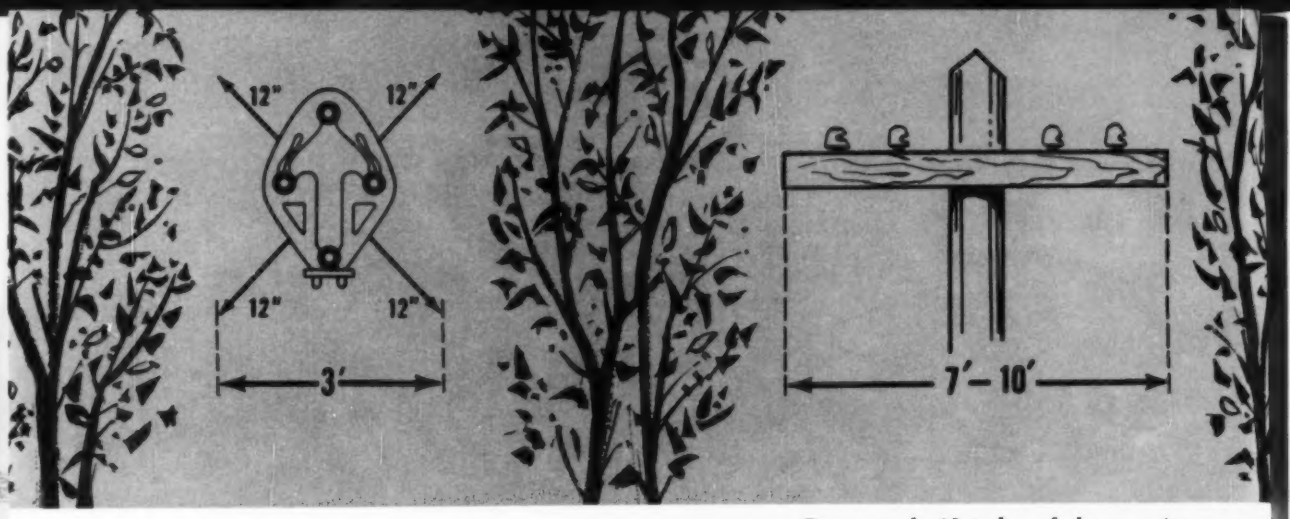
ARC- AND WEATHER-RESISTANT methyl methacrylate spacer is diamond-shaped. Phase conductors are spaced 6 inches apart on equilateral centers.



STEEL-REINFORCED messenger with frequent spacer supports provides a stronger system than open-wire. Spacers maintain positive conductor separation.

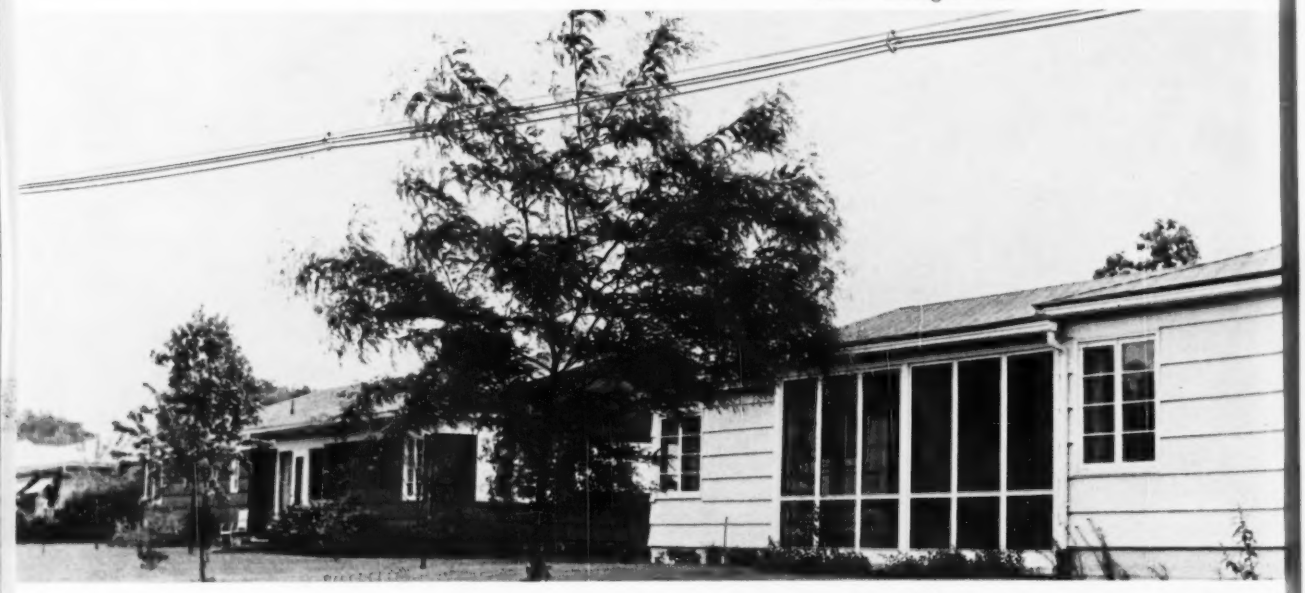


COMPLETELY ENCLOSES conductors. Messengers and phase conductors are *inside*, not *outside* the spacer itself. Conductors cannot work free of spacer.



REDUCE TREE TRIMMING

Because only 12 inches of clearance is necessary to accommodate a TRIMLINE spacer, you reduce your tree-trimming costs! The high-strength supporting messenger of the TRIMLINE System provides protection against falling branches – even trees – during storms.



TRIM NEAT COMPACT

Appearance of TRIMLINE is neat, compact – to please the townspeople. This modern system assures favorable public reaction to overhead circuits – especially in residential areas. And, because less tree trimming is required with TRIMLINE, you'll hear fewer complaints of "defacing" neighborhood shade trees.

MEET THE MAN

WHO'S DEDICATED TO YOUR JOB
YOUR ROME CABLE SALESMAN

ROME CABLE
DIVISION OF **ALCOA**
Dept. 110, Rome, N. Y.

I want to know more about TRIMLINE! Please send me Bulletin RCP-791.

Name .....

Company .....

Title .....

Street .....

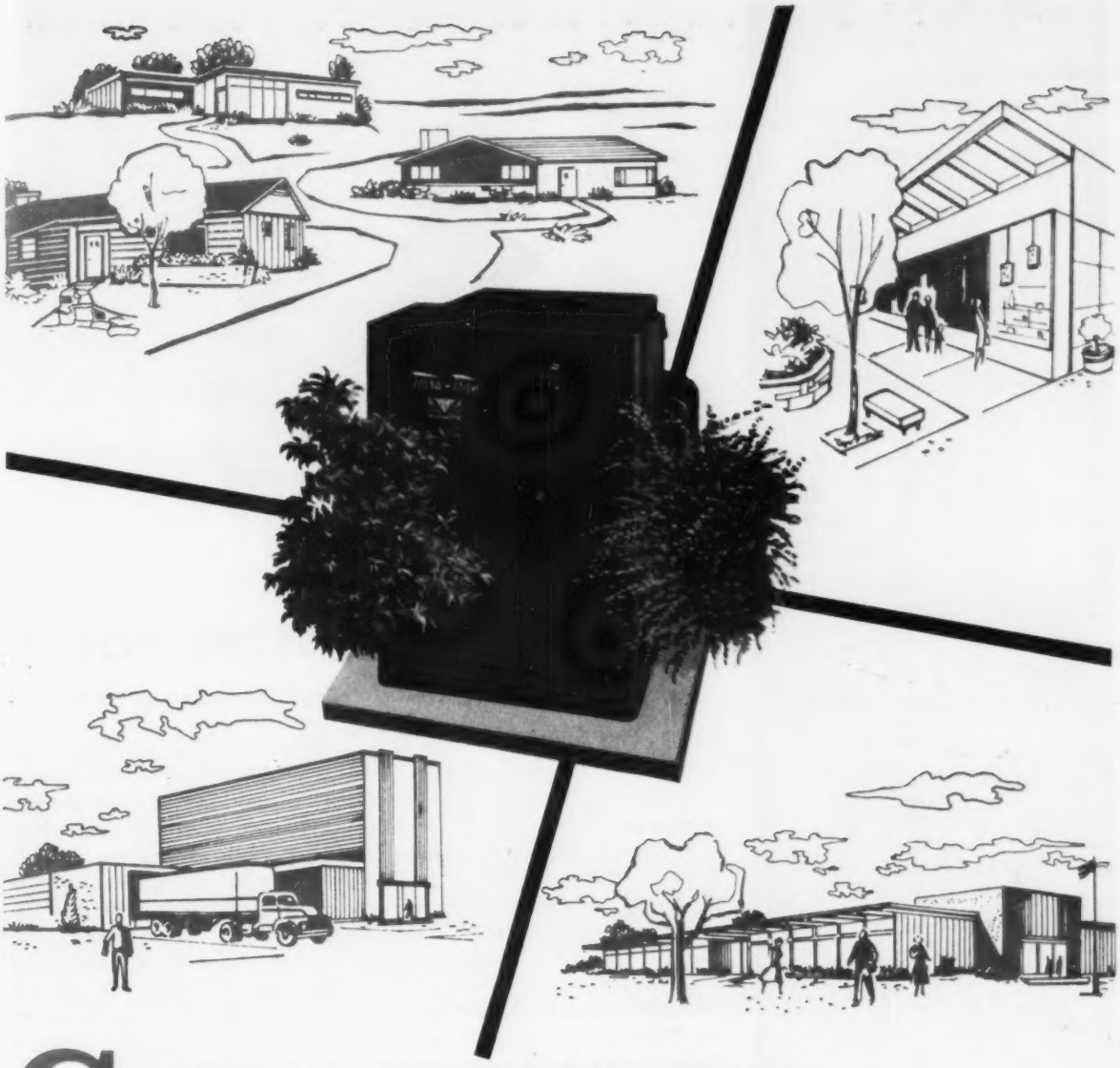
City ..... *Zone* ..... *State* .....

SEND FOR FREE BOOKLET

This holds the answers to whatever remaining questions you might have about TRIMLINE – the practical *and* reliable method of overhead distribution. To get your copy, see your Rome Cable salesman, or clip and mail this coupon today!

ROME CABLE
DIVISION OF **ALCOA**

Litho in U.S.A.

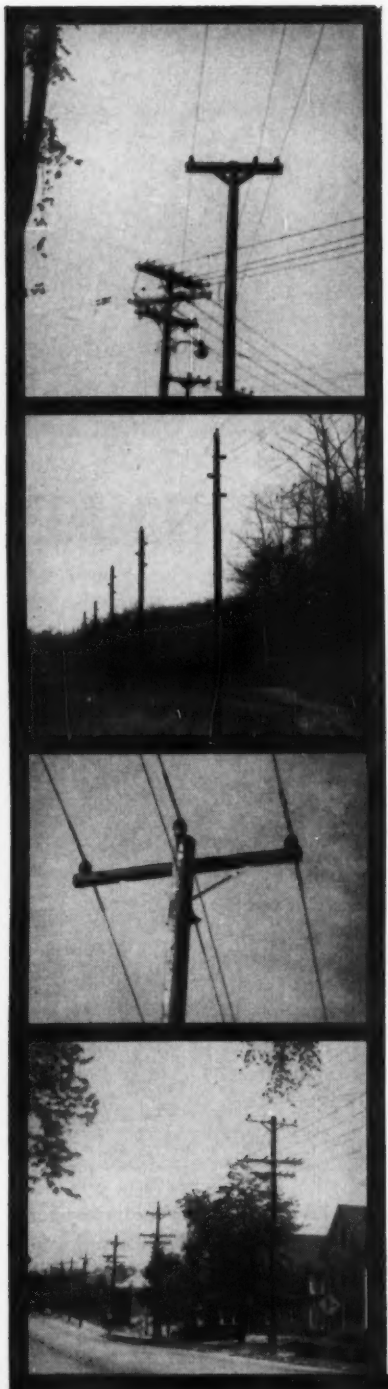


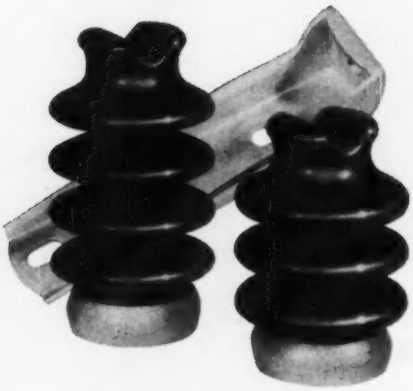
CLEAR HORIZONS

for modern construction are now possible with RT&E's Terra-Tran for underground distribution. Terra-Tran provides improved appearance for residential areas, more reliability for industrial plants, greater safety for institutions, and freedom from primary wires and poles for shopping centers. Terra-Tran is truly the long-sought key to economical underground distribution.

RT&E CORPORATION
WAUKESHA, WISCONSIN
PORTLAND, OREGON

HH





LAPP DISTRIBUTION POSTS

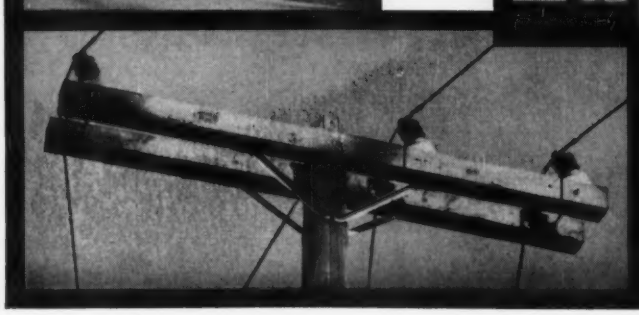
Line Post reliability for distribution lines up to 27 kv

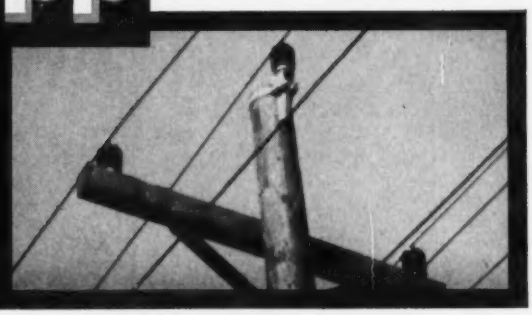
No distribution line you can build will serve as dependably, save as much sleep for your maintenance crews, or build as much customer good-will, as the one you put on Lapp Distribution Posts. These trim-appearing "junior Line Posts" just won't puncture . . . their solid one-piece porcelain body separates conductor from ground for its full length. Won't crack either . . . the only metal-to-porcelain joint is at the base; loading of porcelain is only in large-area, low-intensity compression. Greatly more resistance to flashover and impact, too . . . has short super-sturdy petticoats, with extra protection against failure in the fact that when petticoats are broken away, the post body remains intact with almost its full insulating values. Completely free of radio- or TV-interference at any operating voltage. Fog-type for superior performance in dust or atmospheric contamination.

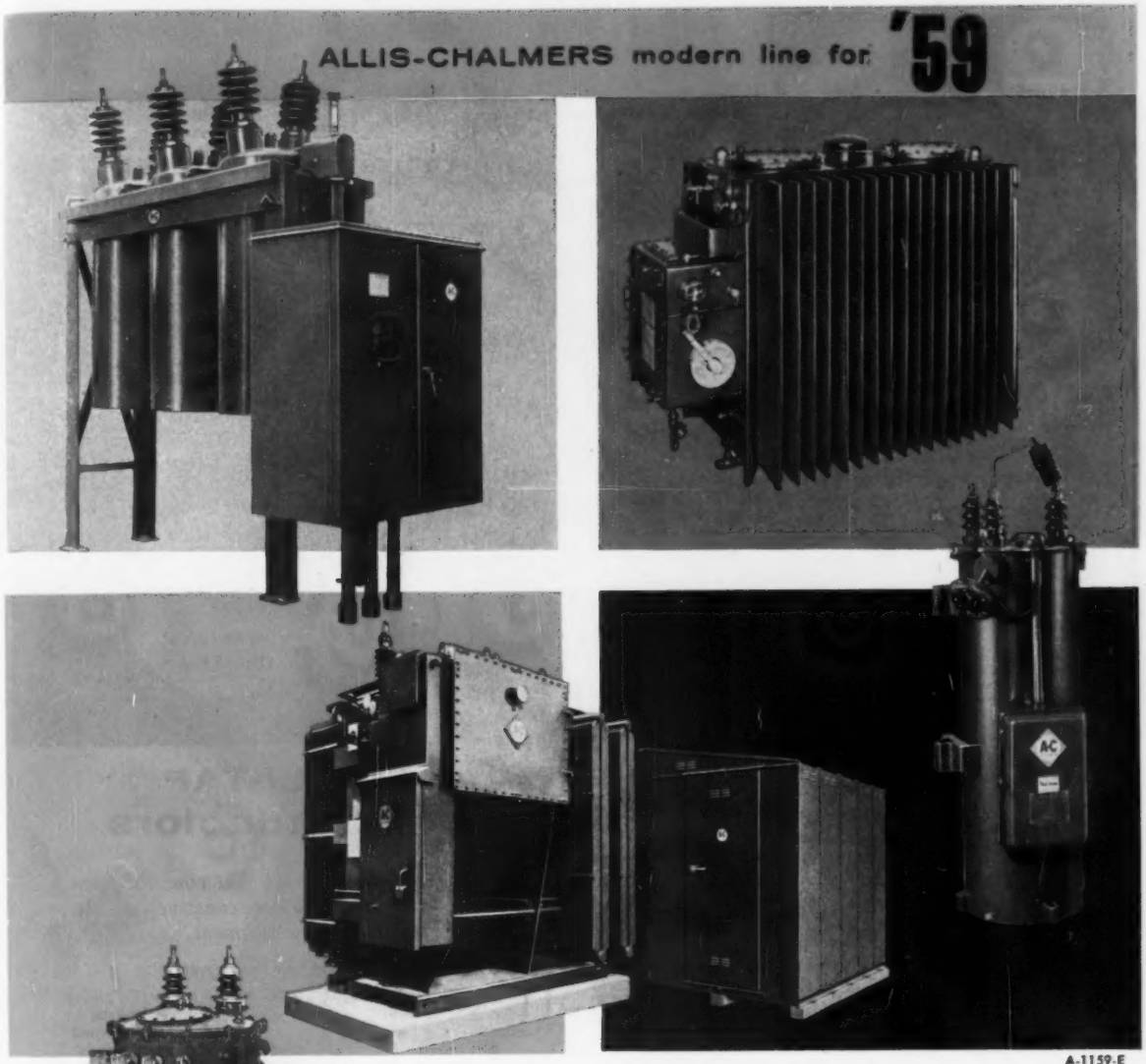
Where else can you get so much for so little cost? Better look into it.

Lapp Insulator Co., Inc., Le Roy, New York.

Lapp







New Standards

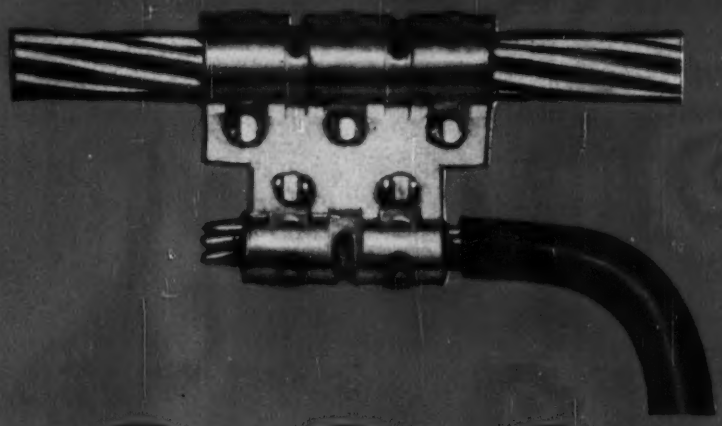
for "standard" equipment

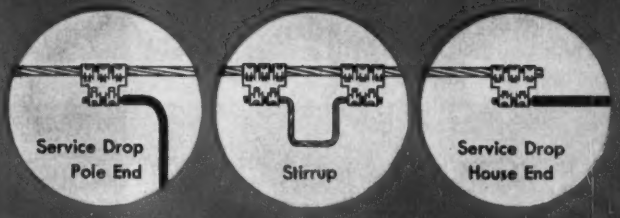
At Allis-Chalmers, only the very basic "nuts and bolts" for our equipment are standard. A-C researchers regularly improve and modernize designs to meet industry's constantly changing application demands. These same unique Allis-Chalmers product features and component designs have a habit of becoming standard on competitive equipment in the industry.

ALLIS-CHALMERS

New standards of performance demonstrated on all A-C products. Contact your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

The TAP that TOPS them all...





THE MULTI-PURPOSE AMP UTILI-TAP for aluminum and/or copper conductors

Tired of all the expensive clutter in your stock rooms—a special tool for this, a special piece of hardware for that? Now you can clear out a lot of your inventory clutter with all new A-MP UTILI-TAP.

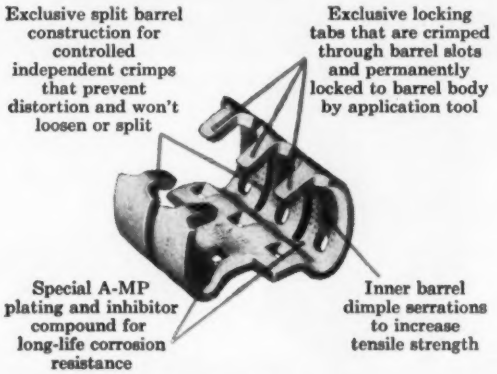
Here is a product that can be used on diverse tapping installations—like no other product on the market. It's permanent, it's sure and it will do many, many jobs.

Your stock can be simplified and easily maintained. Your linesmen can now go up the pole without pockets filled with miscellaneous parts or belts loaded with special tools. Simplify with the A-MP UTILI-TAP.

Light-weight matched tooling available in mechanical or hydraulic types.

The only tap on the market that converts from an easily attached open barrel construction to a permanent, closed barrel attachment.

Look at these unbeatable features:


Exclusive split barrel construction for controlled independent crimps that prevent distortion and won't loosen or split
Exclusive locking tabs that are crimped through barrel slots and permanently locked to barrel body by application tool
Special A-MP plating and inhibitor compound for long-life corrosion resistance
Inner barrel dimple serrations to increase tensile strength

Full range of wire size combinations for aluminum, copper or ACSR conductors.

Send today for more information to solve your tap inventory and reliability problems simultaneously.

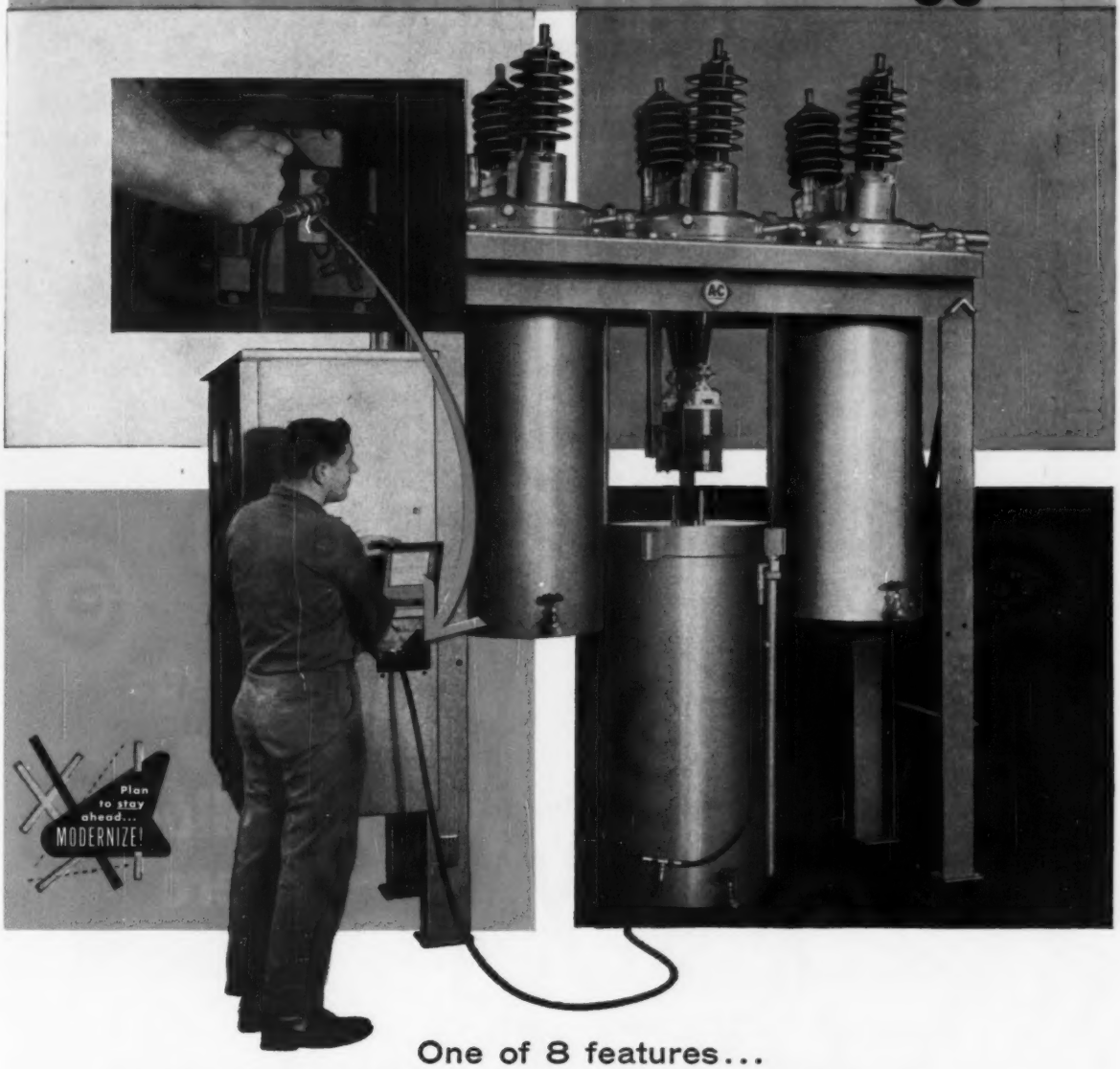
American Pamcor, Inc.

api AMERICAN PAMCOR INC.

GENERAL OFFICES: 181 HILLCREST AVE., HAVERTOWN, PA.

Exclusive Distributor For AMP Products To The Utility Industry

ALLIS-CHALMERS modern line for '59



One of 8 features...

light, fast-acting hydraulic tank lifter

LIFTING and lowering tanks is a one-man job with light, easy-to-handle, easy-to-operate A-C tank lifters. No cables, no pulleys . . . can even be operated manually with *Pneu-Draulic* operator hand pump if control power is not available. Compared with old methods of raising and lowering tanks — takes 80% less time.

Operating Advantages

But this is only one of many outstanding operating advantages of Allis-Chalmers large frame-mounted breakers.

Standard A-C features include:

New 5-cycle interrupting devices
Reliable, fast-acting *Pneu-Draulic* operator
Mechanically and electrically trip-free
Float-type oil gauge
Position indicator
External adjustment of overtravel stop
Single lift-rod guide for accessibility

Write for Bulletin 71B8475. Contact your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

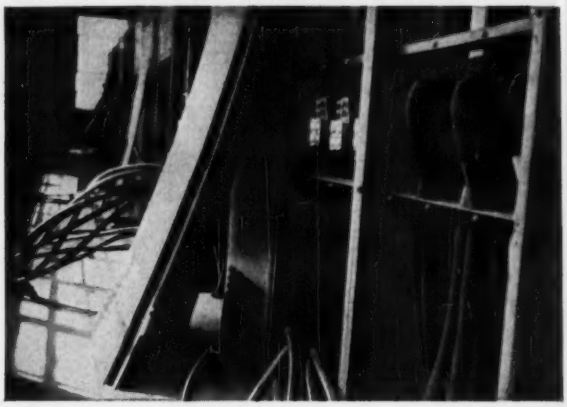
Pneu-Draulic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-5958-E

Installed in underground ducts, Paranite Super Pararite-Paraprene® network cable services a modern electronic computor installation.

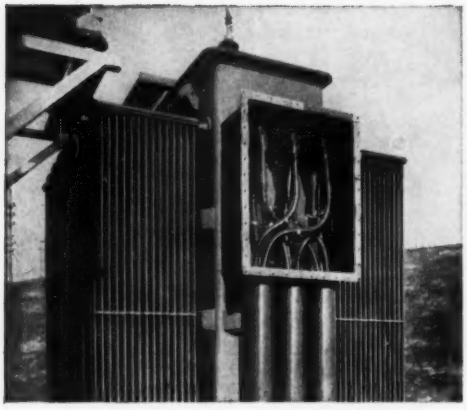
Paranite Super Pararite-Parasyn cables carry primary power between transformers and switchgear control panels in an ore reduction plant.



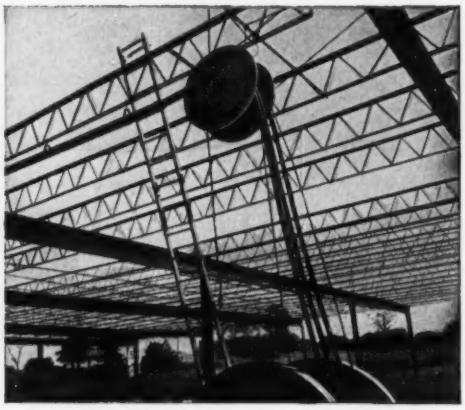
Across the nation for trouble-free installations...

PARANITE®

"IF IT'S PARANITE IT'S RIGHT"®



Paranite Super Pararite-Paraprene cable serves as the primary transformer feeder in a new municipal water pumping station.



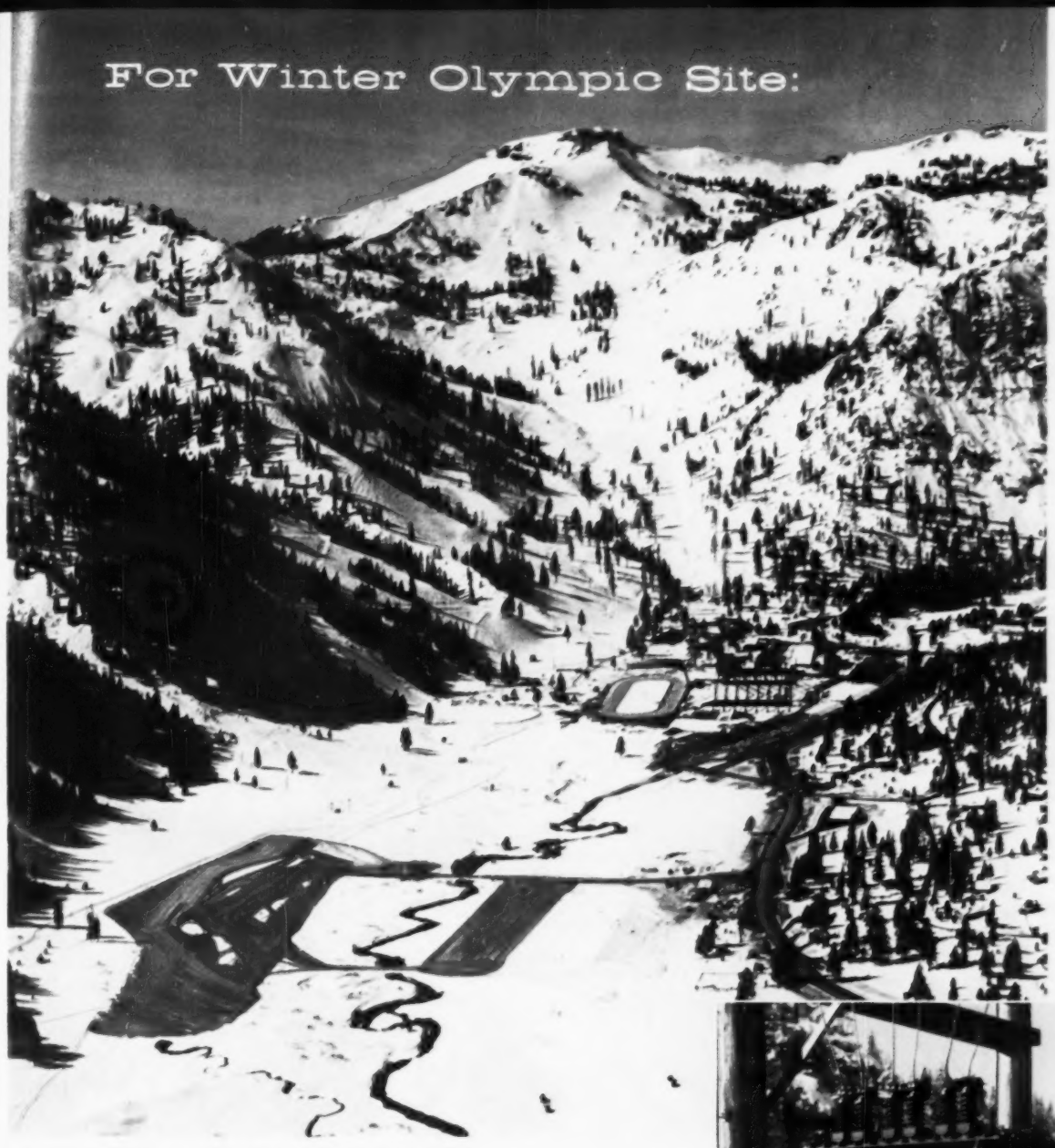
Overhead duct installation of Paranite Super Pararite-Parasyn® (PVC) serves as a secondary feeder cable in a manufacturing plant.

The consistent selection and performance of Paranite cables from 600 volt network through 23,000 volt power cables mark them as products of close quality control. These Super Pararite-Paraprene and Super Pararite-Parasyn (PVC) cables illustrated above, indicate the versatility, national availability and proven trouble-free performance of Paranite installations.

PARANITE WIRE AND CABLE DIVISION

Essex Wire Corporation, Fort Wayne, Indiana

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Birmingham, Ala.; Anaheim, Calif. • Sales Offices in All Principal Cities



New Allis-Chalmers 3-phase SFR Distribution Regulator

Workmen are busily putting the finishing touches on pastel-shaded dormitories, ski tows, ice rinks and, of course, the electrical system at Squaw Valley.

Here in a narrow, steep-sided valley high in the California Sierras will be held the Winter Olympics a short time from now.

The new, compact, weight-saving three-phase distribution regulator design by Allis-Chalmers was selected as the ideal solution to their voltage regulating problem.

- These units save 33% space; cost 30% less per kva of 3-phase regulation; weigh 20% less; provide 160% *Vari-Amp* rating to 600 ampere maximum.

For help in revaluating your present substation planning, contact your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS A-C

A-1150-E

Bristol Dynamaster* Electronic Instruments have proved themselves in thousands of installations. They fully meet today's most exacting standards of accuracy and dependability. They measure almost any variable that can be translated into an electrical quantity (d-c current, d-c voltage, resistance or capacitance). Just a few are: temperature, pH, speed, voltage, smoke density and strain.

Here are some outstanding features that make them ideal for industrial plants, pilot plants, and for research, test, and laboratory use:

1. Continuous standardization—eliminates standardizing mechanism and dry cell—no interruption to control. **But retains precision standard cell for highest accuracy and stability.**

2. Simple design—few moving parts.

3. Easy to use and service—little or no maintenance required.

4. Rugged construction—unaffected by vibration.

MODELS FOR EVERY PURPOSE. Dynamaster Instruments are now available as:

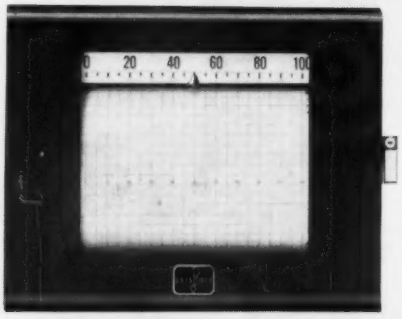
A. Single-pen, two-pen, and multiple-record (up to 24 points) strip-chart instruments.
B. One- and two-pen round-chart recorders.
C. High-speed recorders (0.4 second).
D. X-Y recorders.
E. Extended range recorders.
F. Adjustable span and zero recorders.
G. Miniature 3-inch strip-chart recorders.
H. Electric controllers in both strip- and round-chart models—all types of control action and as time-program control.
I. Pneumatic controllers in both strip- and round-chart models—all types of control action and time-program control.
J. Instruments for electronic measurement—pneumatic transmission of reading by 3-15 psi signal.
K. Round chart program controllers.
L. Telemetering transmitters.
M. Drum-type precision indicators.
N. Multi-bank recorder—will accept up to 200 separate inputs and record them on 12-inch wide strip chart.
O. Relay-rack mounting models—most models available in case that fits standard 19" relay-rack without modification to instrument or rack, without panel-cutting or masking.

Bristol Dynamaster Potentiometer and Bridge Instruments can be equipped with analog-to-digital encoders of various types for digital readout and computer use. For complete details, write for Bulletins P1245A, P1270, P1271, P1242, and P1282. The Bristol Company, 116 Bristol Road, Waterbury 20, Conn.

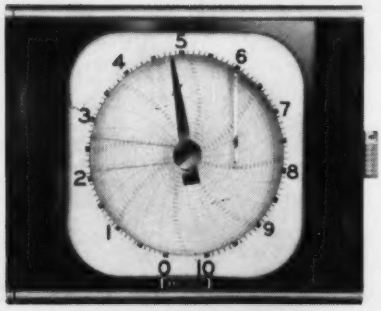
*T. M. Reg. U. S. Pat. Off.

look to Bristol for the complete line of

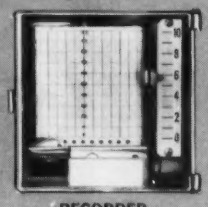
ELECTRONIC POTENTIOMETER and BRIDGE INSTRUMENTS



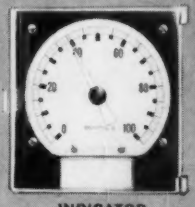
Dynamaster* Electronic Potentiometer or Bridge—records on 11-inch, 120-foot-long strip chart.



Dynamaster* Electronic Potentiometer or Bridge—records on 12-inch round chart, indicates on extra-large scale.



RECORDER



INDICATOR

Plug-in Miniature Electronic Dynamaster Potentiometer and Bridge instruments—Only 5" x 5⅛" panel dimensions; ideal for graphic panel instrumentation.

BRISTOL
TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Get the most out of transformer rebuilding

Specify

WAGNER FORM W

Replacement Assemblies

for full NEMA Standard Cores and Coils with *new low impedance and lower core losses*

Whether you rebuild your own transformers or send your rebuilds out—it will pay you to specify Wagner Form W Replacement Core and Coil Assemblies. With Wagner, you get full NEMA Standard elements, exactly like those used in new Wagner Transformers.

You get the advantages of lower impedance values, better regulation and lower losses. You get the most out of up-rating, too—in sizes up through 15 kva, you can install the largest cores and coils that will fit your tank and still remain within NEMA temperature rise standards.

Wagner Replacement Assemblies come to you ready to install. They have been fully tested and dried, and are packaged in transformer oil for complete protection. Available in ratings from 3 through 167 kva.

WAGNER FIELD REPAIR SERVICE FOR SUBSTATION TRANSFORMERS

Wagner Transformer Service Trucks, manned by expert field repairmen, are available on schedule. The cost of this exclusive Wagner service is nominal. Write for details.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation

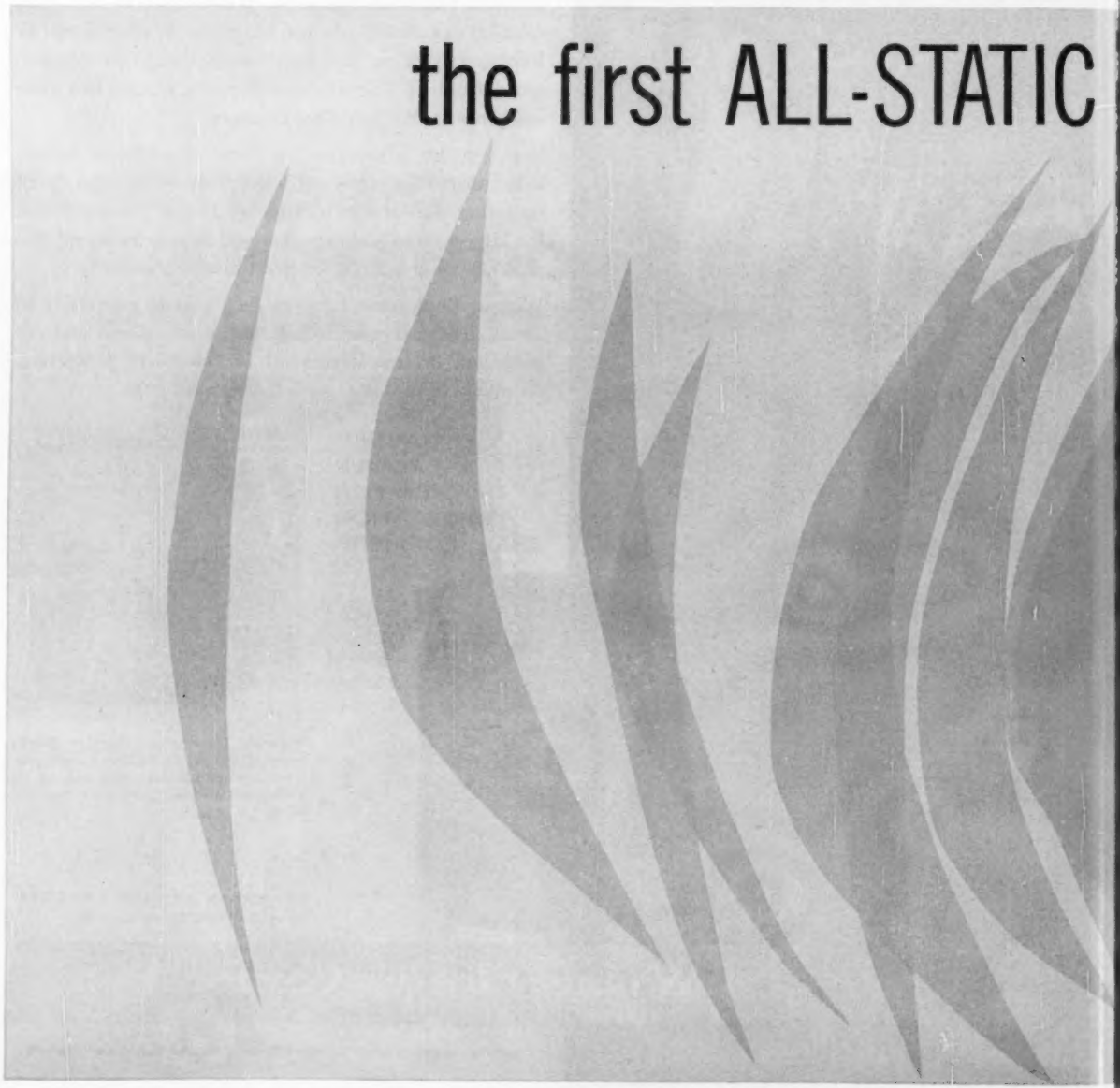
SERVING 2 GREAT GROWTH INDUSTRIES... ELECTRICAL... AUTOMOTIVE

WR593

The new Type SA represents a promising start toward realizing the potential advantages that abound in the use of semi-conductors. Based on 21 years of study and experience in static-relaying circuitry that started with our Type HCB relay in 1938, the SA holds promise for low maintenance, better sensitivity, lower op-

WESTINGHOUSE

the first ALL-STATIC



erating energy and more compact construction. Faster response will be limited only by the time required for integration (the thinking and command function).

Protective relaying took a long stride forward with the development of this new Westinghouse 3-phase relay for generator protection.

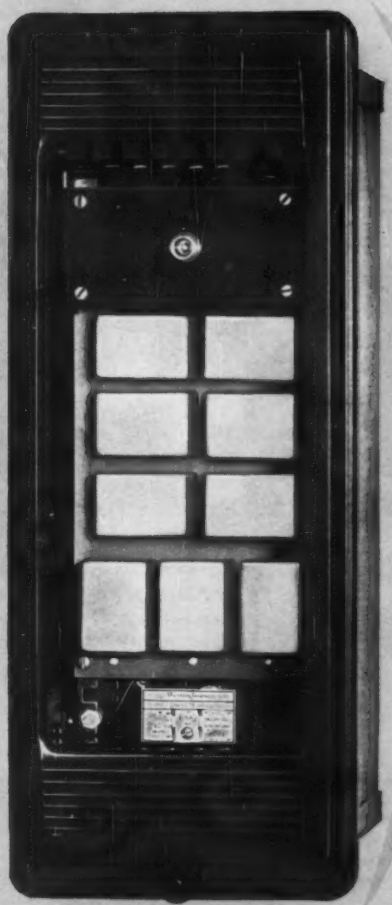
Call your Westinghouse sales engineer to get the story on our work in the field of statics and protective relaying. J-40527

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS CBS TV FRIDAYS

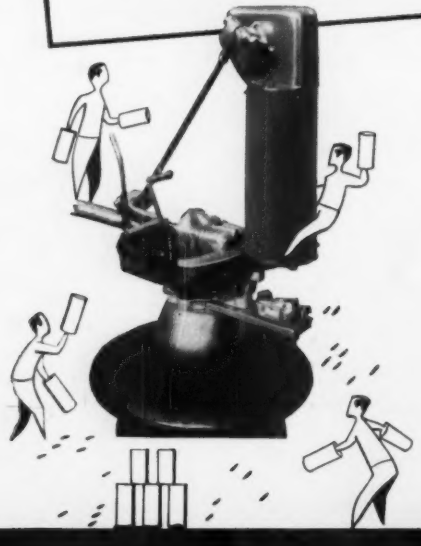
ANNOUNCES THE SA

differential generator relay



LOAD INTERRUPTION in a VACUUM!

with VAC-RUPTERS* BY HI-VOLTAGE - JOSLYN



A new concept in load interruption for every type of load, regardless of power factor, including:

- Transformer magnetizing current
- Capacitor banks
- Line sectionalizing

Exclusive features* include:

Modular shatter-proof housing—no glass or porcelain. Interior potting for support and protection of the vacuum switch. External terminals for testing vacuum switch. Elimination of moisture condensation problems.

Get the complete story. Ask your Joslyn representative or send for Bulletins 30-205, 30-215, and 30-220.

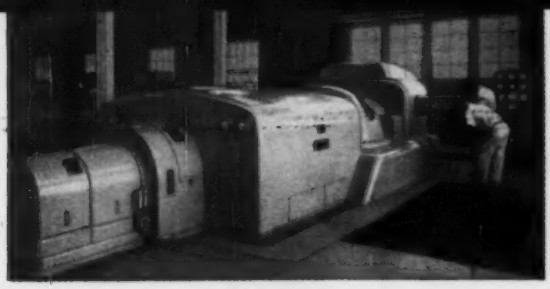
*Patents pending

HI-VOLTAGE EQUIPMENT COMPANY

DIVISION OF JOSLYN MFG. & SUPPLY CO.

4000 EAST 116th STREET • CLEVELAND 5, OHIO

PRODUCERS OF *QUALITY* AIR-BREAK SWITCHES SINCE 1920



Plant superintendent James Easton and Standard Oil industrial lubrication specialist Charlie Brown inspect 5,000 kw. Worthington turbine, one of four turbines in Fairfield Municipal Light & Power Company plant lubricated with NONPAREIL Turbine Oil.

One reason why Fairfield, Illinois has efficient electric service—

Nonpareil Turbine Oil

These turbine installations trace the record of growth in electric power consumption in Fairfield, Illinois, over the past 19 years:

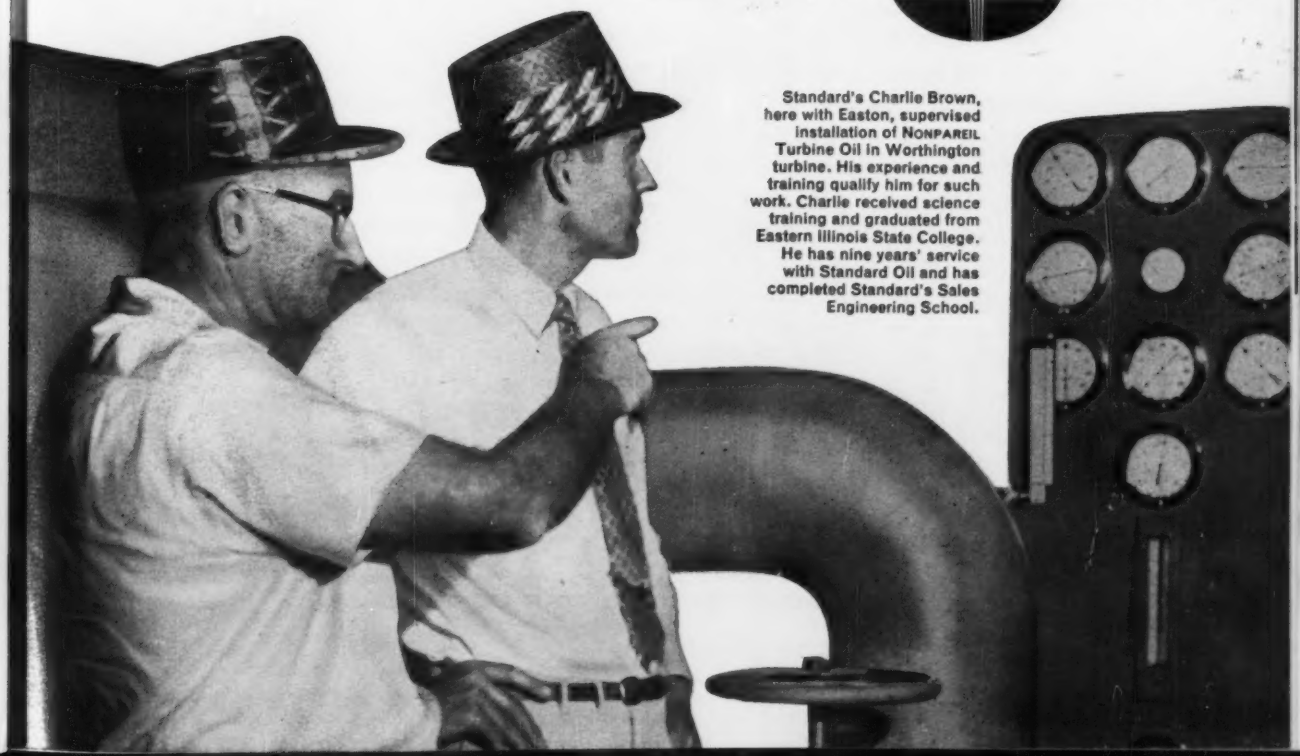
Type	Turbine Cap.	Installed
Westinghouse	1,500 kw.	March, 1940
Westinghouse	2,500 kw.	March, 1942
Westinghouse	4,000 kw.	March, 1949
Worthington	5,000 kw.	July, 1957

When the first turbine went into service, Fairfield Power plant management decided upon a turbine lubricant they felt would be dependable—NONPAREIL Turbine Oil. Standard Oil, they found, would give them concrete evidence of the oil's dependability. They received a certificate guaranteeing that, for the life of the turbine, the acidity of the oil would never exceed 0.15 mg. KOH/g. Indeed, through the years the oil has remained at a much lower acidity level, usually in the order of 0.06 mg. KOH/g. Periodic analysis of the oil in Standard's Whiting laboratory confirms that the oil is performing according to guarantee.

The kind of service Fairfield Municipal Light & Power gets from NONPAREIL Turbine Oil comes about this way: NONPAREIL is the subject of special refining techniques and handling. A special crude is used as a base stock. All sludge-forming compounds are removed. An oxidation inhibitor which permanently controls acidity is added. No sweetening or resting of NONPAREIL Turbine Oil is required at any time.

Men with experience in turbine lubrication can give you more facts about NONPAREIL Turbine Oil. Call your nearby Standard Oil office in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** *and you get it!*

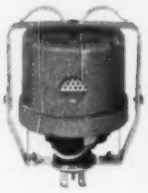


Standard's Charlie Brown, here with Easton, supervised installation of NONPAREIL Turbine Oil in Worthington turbine. His experience and training qualify him for such work. Charlie received science training and graduated from Eastern Illinois State College. He has nine years' service with Standard Oil and has completed Standard's Sales Engineering School.

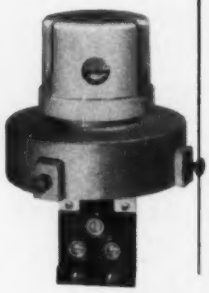
Luminaire or slipfitter mounting, bases up to 3" diam. . . . Model 6600A. (For bases up to 3⅝" diam. . . . Model 6607A)

Pole or crossarm mounting . . . Model 6601A

Replacement plug-in for F-P Model S-64400 . . . Model 6604A. (Also, Model 6603A replacement for F-P Model S-64400GE.)



Ornamental pole top mounting . . . Model 6600A with S-485 adapter (adapter also available for poles with I. D. less than 3")



Bracket mounting . . . Model 6600A with S-487 clamp assembly.

FISHER-PIERCE 6600A PHOTOELECTRIC CONTROLS

no mounting problems here..

You can put Fisher-Pierce 6600A Series controls *into* service quickly, easily and safely in almost any location – and they'll *stay* in service for years of maintenance-free operation. *Directional operation* and *delayed circuit response* provide uniform turn-on, protection against accidental turn-off; *built-in expulsion-type arrestor* protects control against surges and lightning; *broad area hermetically sealed CdS cell* is pre-aged and 100% inspected against rigid specifications; *circuit design conservatively derates* all components; *twistlock plug, base dimensions and sealing means* conform to EEI-NEMA standard for twistlock adaptations; all Series 6600A controls are *unconditionally guaranteed for two years.*

For complete descriptive details, write for the 8-page Detailed Technical Bulletin, no. FP-830. The Fisher-Pierce Co., 82 Pearl St., So. Braintree 85, Mass.

FP

FISHER PIERCE

PHOTOELECTRIC LIGHTING CONTROLS

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

Type OV-25
with built-in ballast

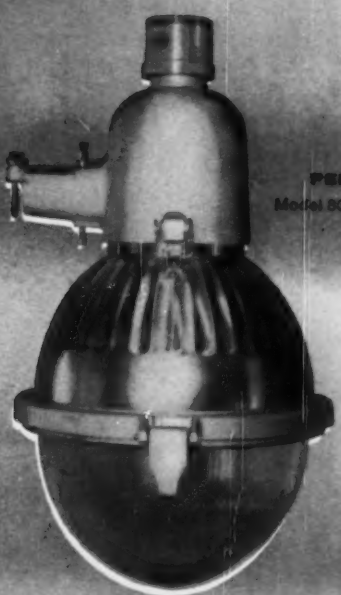
WESTINGHOUSE

Type OV-10

Model 6600A
Actual Size

WHEELER
Crescent Luminaire

JOSLYN
Model J152278C

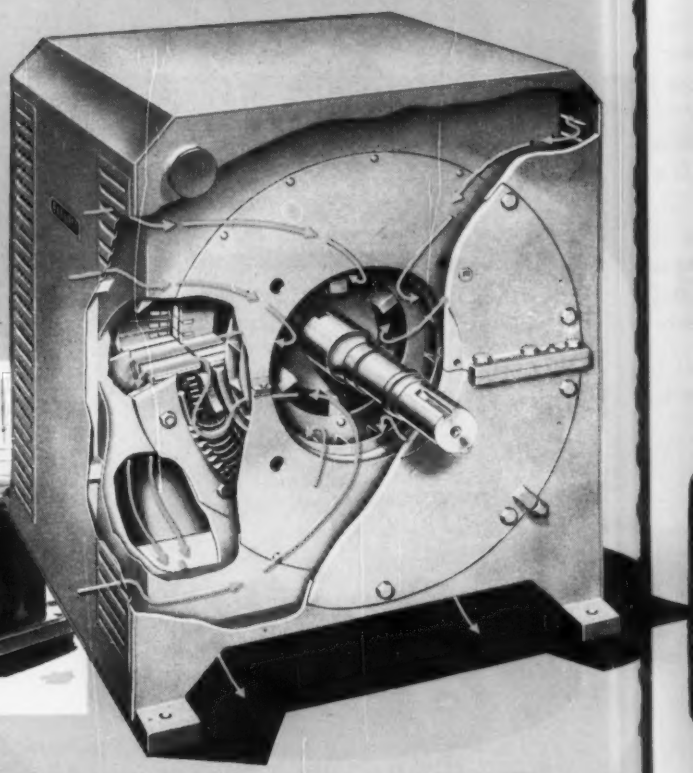


PEMCO
Model 800530H-06

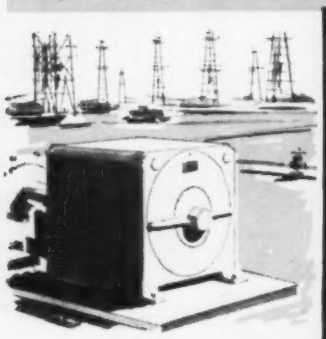
What's this ABOUT PUTTING

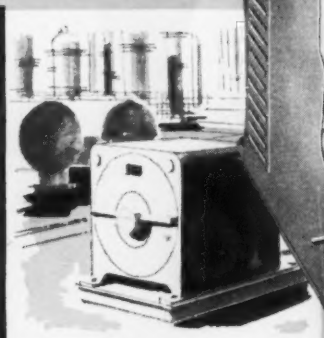
You can rely on Elliott Application Engineering...

Open Dripproof designs



Typical applications include outdoor installations (up to 5,000 volts) in petroleum, chemical, steel, mining, paper and many other industries.





AMPLE PROTECTION

for many applications and operating conditions due to the record-breaking performance of Fabri-Seal insulation

Today's large Elliott squirrel-cage induction motors with the now famous FABRI-SEAL coil insulation give you the most complete winding protection available. No other insulation system has such a long record of *proven* field service. Installed in over 2,000,000 hp of motors since 1948, FABRI-SEAL has chalked-up an *unmatched* 10-year operating record.

Note the excellent protection provided by the Elliott dripproof motor enclosure. Skillful arrangement of louvers and baffles prevents incoming air from impinging directly on the motor windings. The changes of direction imposed on the entering air help throw off entrapped moisture and dirt, protecting vital internal parts. This standard enclosure is not only dripproof, but offers splashproof protection equal to that of many splashproof enclosures.

ALL LARGE ELLIOTT INDUCTION MOTORS RECOMMENDED FOR OUTDOOR SERVICE FEATURE:

- protection of all metal parts from corrosion
- space heaters to prevent condensation during shutdown
- screens on air inlets to protect against debris

"INDOOR" MOTORS OUTDOORS?

Elliott engineers will carefully analyze your operating conditions and advise you frankly what type of motor enclosure will give your motors the protection you need . . . at lowest over-all cost.

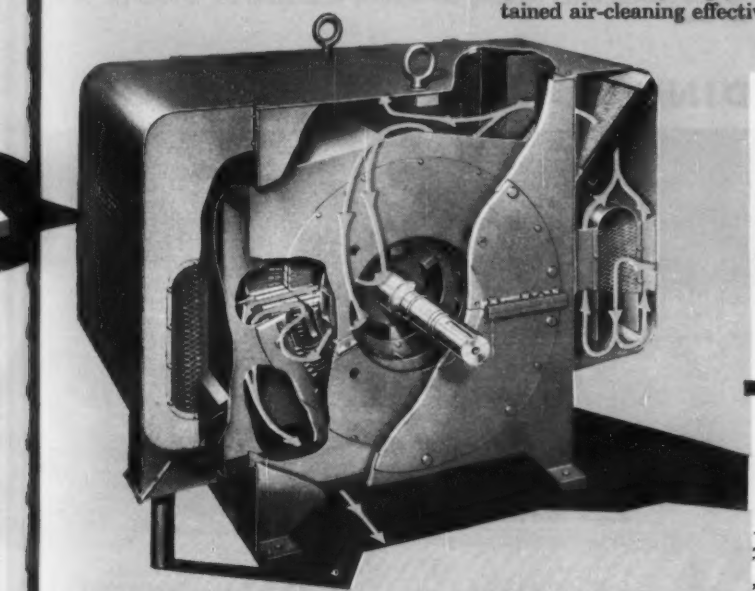
or Weather-Protected enclosures

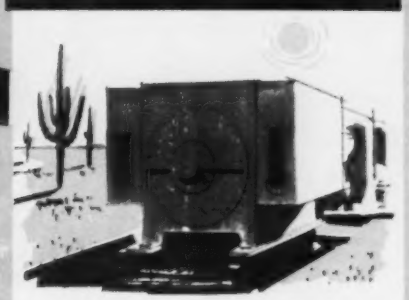
ULTIMATE PROTECTION

and assured continuity of service in the most severe conditions—driving rains, blizzards, hurricanes, salt spray, dust storms

Years ago, Elliott engineers foresaw the need for fully weather-protected outdoor motors for applications where wind and rain achieved hurricane proportions or where chemical fumes, salt spray, and extreme moistures prevailed. Such a motor would provide optimum reliability, insure continuity of service, and eliminate costly housing. Elliott subsequently designed and built such a motor—the first *really* "weather-protected" motor, with FABRI-STEEL construction and FABRI-SEAL coil insulation. Since 1948, more than 800,000 hp of these weather-protected motors have been installed and have achieved an unmatched 10-year field service record.

The cutaway illustrates how screened horizontal air inlets permit through passage of wind-driven rain, snow or sand; multiple baffles impose numerous direction and velocity changes on the entering air, assuring efficient removal of air-borne moisture; and (when desirable) large, cleanable air filters for maximum sustained air-cleaning effectiveness.





Typical applications include utilities, pipelines, refineries, chemical plants, and other outdoor installations involving severe weather or atmospheric conditions.

ELLIOTT Company
Ridgway Plant, Ridgway, Pa.

Tough Formex† insulation being extended to G-E69-

Now General Electric's Formex film insulation, proved through years of use to be superior to other types of turn insulation on transformers up to 34.5 kv, is being extended to 69-kv medium* transformers. Here are the facts from recent accelerated life tests . . .

- **FORMEX** insulation lasts four times longer than paper insulation at temperatures suitable for paper (105C).
- **FORMEX** insulation is a satisfactory turn insulation at operating temperatures at least 10 C higher than paper.
- **FORMEX**, after partial dielectric deterioration, will regain insulation strength after return to equilibrium moisture conditions.

Since turn insulation is adjacent to wire at the hottest part of a transformer, it is the most critical of transformer insulations. The use of Formex for turn insulation instead of cellulosic insulations effectively eliminates the largest moisture-producing source in G-E medium transformers.

Application of Formex insulation to higher insulation classes of medium transformers is part of General Electric's continuing efforts to provide even better products. Recent evaluation of experimental units indicates superior performance on all Formex insulated 69-kv

†Reg. Trade-mark of General Electric Company.

*MEDIUM TRANSFORMERS (including RM—repetitive manufacture) 501 to 7500 kva, 69 kv and below.

WINDING FORMEX

E69-kv medium transformers

edium transformers. As a result, Formex insulation will be in pro-
duction on 69-kv G-E medium transformers by the end of 1959.

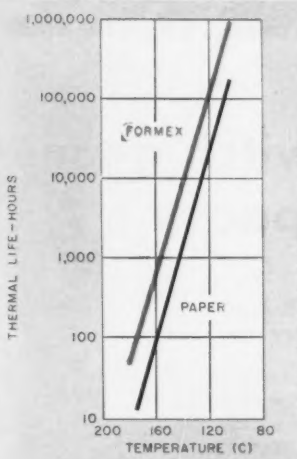
Product leadership is just part of our story. General Electric medium transformers are certified to deliver **full value** for your transformer dollar . . . in terms of superior products . . . plus faster order handling and shipment . . . plus complete service before, during and after installation. When deciding on your next medium transformer, examine the **complete "package"** offered by General Electric. When you do, we're confident that you'll recognize General Electric superiority.

Your G-E Apparatus Sales Engineer can show you all the ways you get full value for your transformer dollar from General Electric. Ask him today for details on the Certified Full-value Transformer Program. General Electric Co., Schenectady 5, N. Y. 416-26

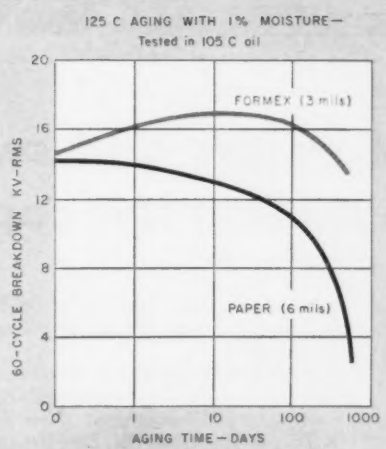
Progress Is Our Most Important Product

GENERAL ELECTRIC

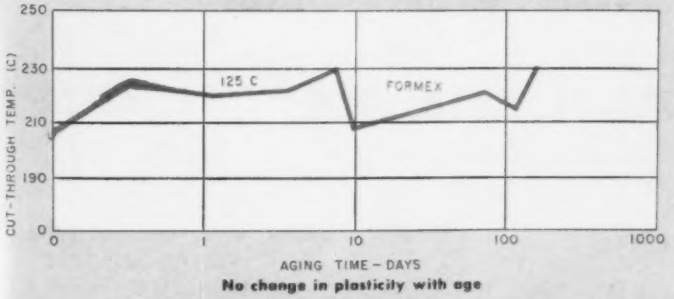
AGING CHARACTERISTICS



Four times life of paper insulation at 105C

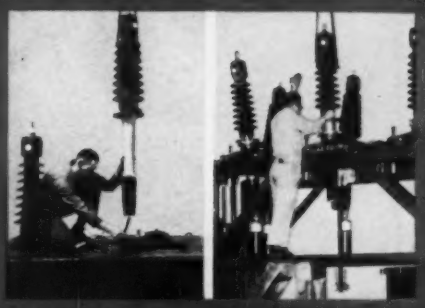


Twice the 60-cycle dielectric strength of paper



No change in plasticity with age

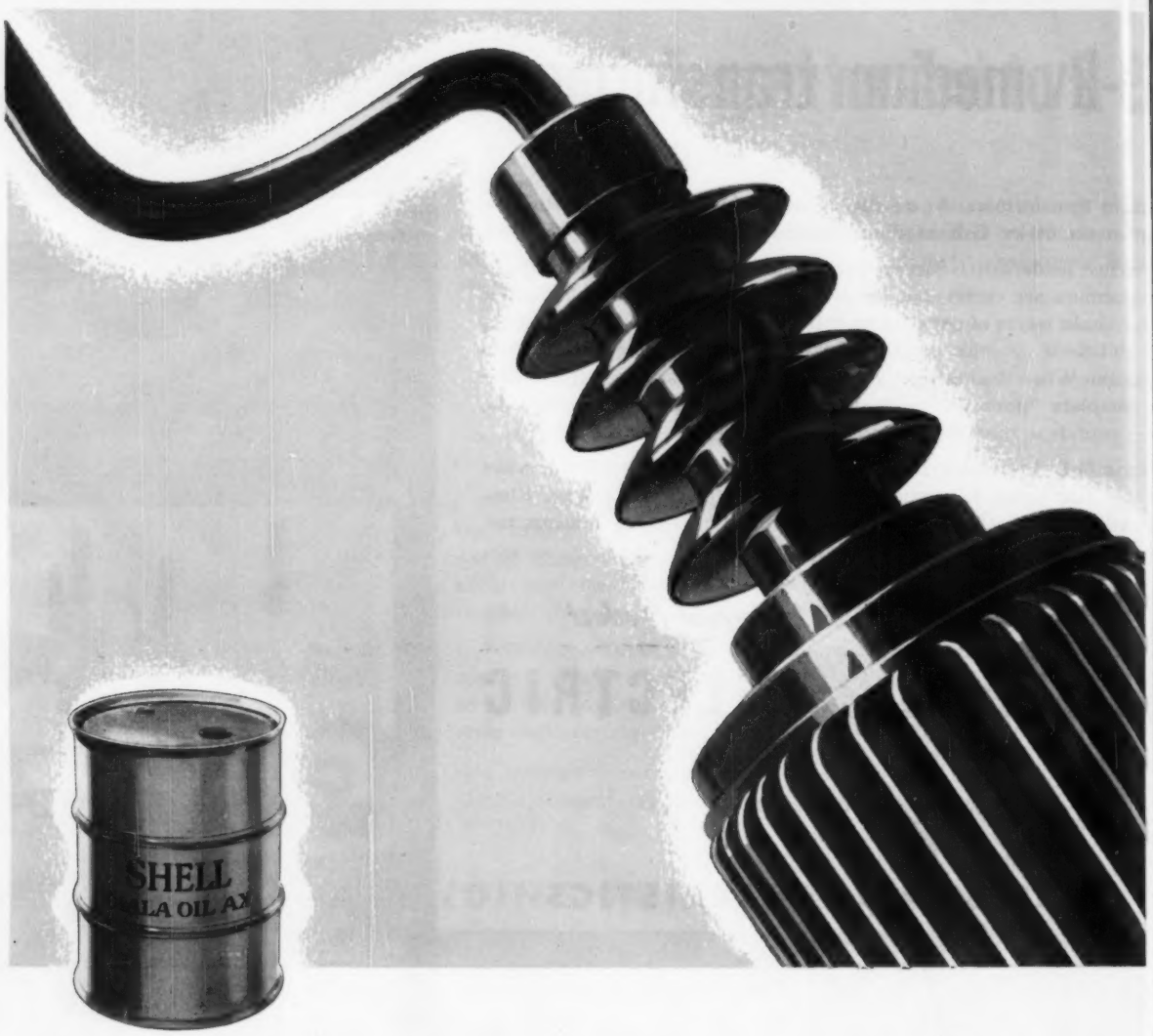
FULL VALUE FOR YOUR TRANSFORMER DOLLAR



SUPERIOR DESIGN, FEATURES, AND PERFORMANCE of General Electric transformers is typified by pre-fabricated enclosure (above) and interchangeable transformer-breaker bushings (below).

FASTER SHIPMENT through rapid processing of orders . . . computer design capability . . . repetitive manufacturing facilities.

COMPLETE SERVICE . . . application and systems engineers . . . installation engineers . . . 50 conveniently located service shops.



Now used in transformers and switch gear totaling over 25 million kw capacity

Shell Diala Oil AX has an enviable preference record in the electric power industry. This is due to its exceptional oxidation stability, plus high dielectric strength and low pour point. It all adds up to the utmost in reliability, equipment protection and long life.

Shell Diala Oil AX is inhibited to prevent oxidation . . . it has established new high standards throughout the industry. Actual tests show that Diala® Oil has two to three times greater stability than conventional oils.

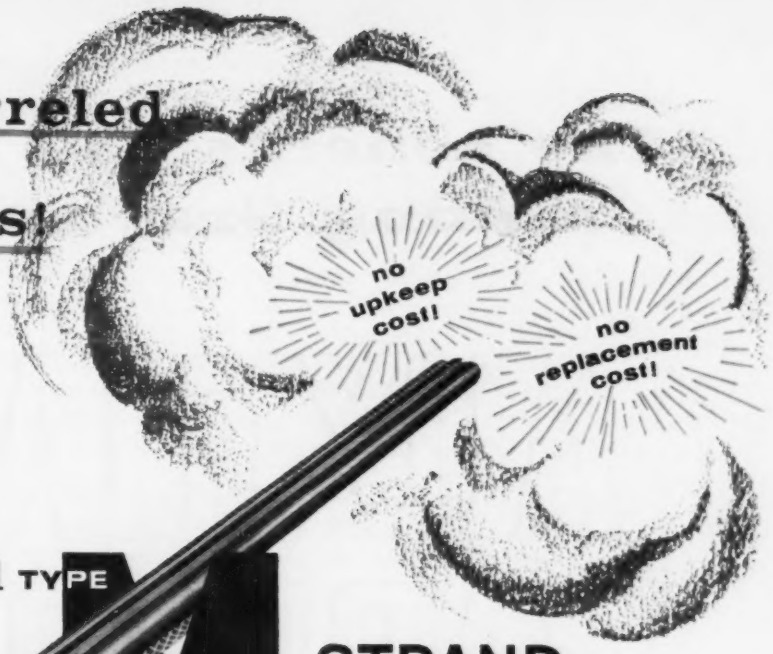
Let a Shell Representative tell you about Shell Diala Oil AX. Write or call: Shell Oil Company, 50 West 50th St., New York 20, N. Y., or 100 Bush St., San Francisco 6, California. In Canada: Shell Oil Company of Canada, Limited, 505 University Ave., Toronto 2, Ontario.

SHELL DIALA OIL AX

the inhibited insulating oil

SHELL

double-barreled savings!



with Copperweld TYPE M T.M. STRAND

If you're aiming for savings, you'll hit your mark by using Copperweld Type M Strand. Since Copperweld is non-rusting, you save money by eliminating both maintenance and replacement costs.

Every wire in Type M Strand is permanently protected against corrosion by a heavy sheath of pure copper inseparably molten-welded to an alloy steel core. This exclusive Copperweld process assures a permanent high-strength, non-rusting strand with a ductile copper covering that will never crack, flake or peel.

Easy to handle—easy to install—Type M Strand can be readily bent, served, moused or clamped. Write us today for complete information about its money-saving features.

COPPERWELD STEEL COMPANY

WIRE AND CABLE DIVISION *Glassport, Pa.*

For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

Copperweld®

TYPE **M** STRAND

FOR GUYS AND MESSENGERS

The benefits you gain by making Graybar your

AUXILIARY* WAREHOUSE

What do we mean by AUXILIARY? We mean a warehouse that in every possible way assists you in the big, complex job of keeping electrical equipment and supply lines filled . . . a warehouse staffed to work closely with your own warehouse and stores personnel . . . and plan-stocked with quality products of the industry's leading manufacturers.

• Graybar as auxiliary warehouse can save you money on bookkeeping time—one source, one responsibility saves much of the expense involved in writing and processing multiple orders.

• Graybar as your auxiliary warehouse clearly enables you to shorten inventory on many kinds of equipment and supplies and this saves capital ordinarily tied up in inventory.

• Graybar's nearby location is assurance that projects and maintenance can proceed according to schedule; that emergencies can be handled with all possible dispatch. You get the right materials at the right time, ending the delivery delays and uncertainties often encountered when ordering from a distant source. Through frequent contacts with your purchasing and stores personnel Graybar anticipates your needs and carries the stock to stay ahead of them.

• Only Graybar is so well qualified to serve you in the important capacity of auxiliary warehouse. And all of the warehouses in Graybar's nationwide network can work with the utility industry in this way.

• The Graybar warehouse on *your* line is a link in this network. It is staffed and equipped to provide you with an unmatched range of the most modern utility equipment and supplies.

Make Graybar *your* auxiliary warehouse. Start with a local call. Have your Graybar man stop in and discuss with you how we can be of service to you.

**aux·il'ia·ry (ôg·zil'yá·ri), adj.* (L. *auxiliarius*, fr. *auxilium* help, aid.)
1. Conferring help or aid; assistant; supporting.
2. Subsidiary; also, additional. 3. Serving to supplement.

938

GraybaR

Everything Electrical · GraybaR Electric Company

ELECTRIC COMPANY, INC.
420 Lexington Avenue, New York 17, N. Y.

IN OVER 130 PRINCIPAL CITIES

LOCAL SERVICE TO UTILITIES THROUGH COAST-TO-COAST WAREHOUSING

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KELLOGG'S

FABRICATION-

ERECTION

SERVICES

KEEP PACE

No designer-fabricator-erector of power piping has worked so closely with the industry as Kellogg to meet the increasingly more critical steam pressure/temperature requirements of the nation's electric utilities.

Long a leader in the application of the newer alloys, and in the development of better welding materials and welding techniques for the power generating industry, Kellogg is today privileged to announce more than a dozen projects concurrently executed with the *five* major utilities, listed above. Each of these major assignments includes the use of Kellogg's K-Weld® technique for welding the main steam and other critical lines, both in field erection and shop fabrication.

Kellogg welcomes inquiries on its complete fabrication and erection service to the power piping industry from consulting engineers, engineers of power generating companies, and manufacturers of boilers, turbines, and allied equipment.

Fabricated Products Sales Division, THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17, N. Y.

A SUBSIDIARY OF PULLMAN INCORPORATED

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POWER PIPING—THE VITAL LINK

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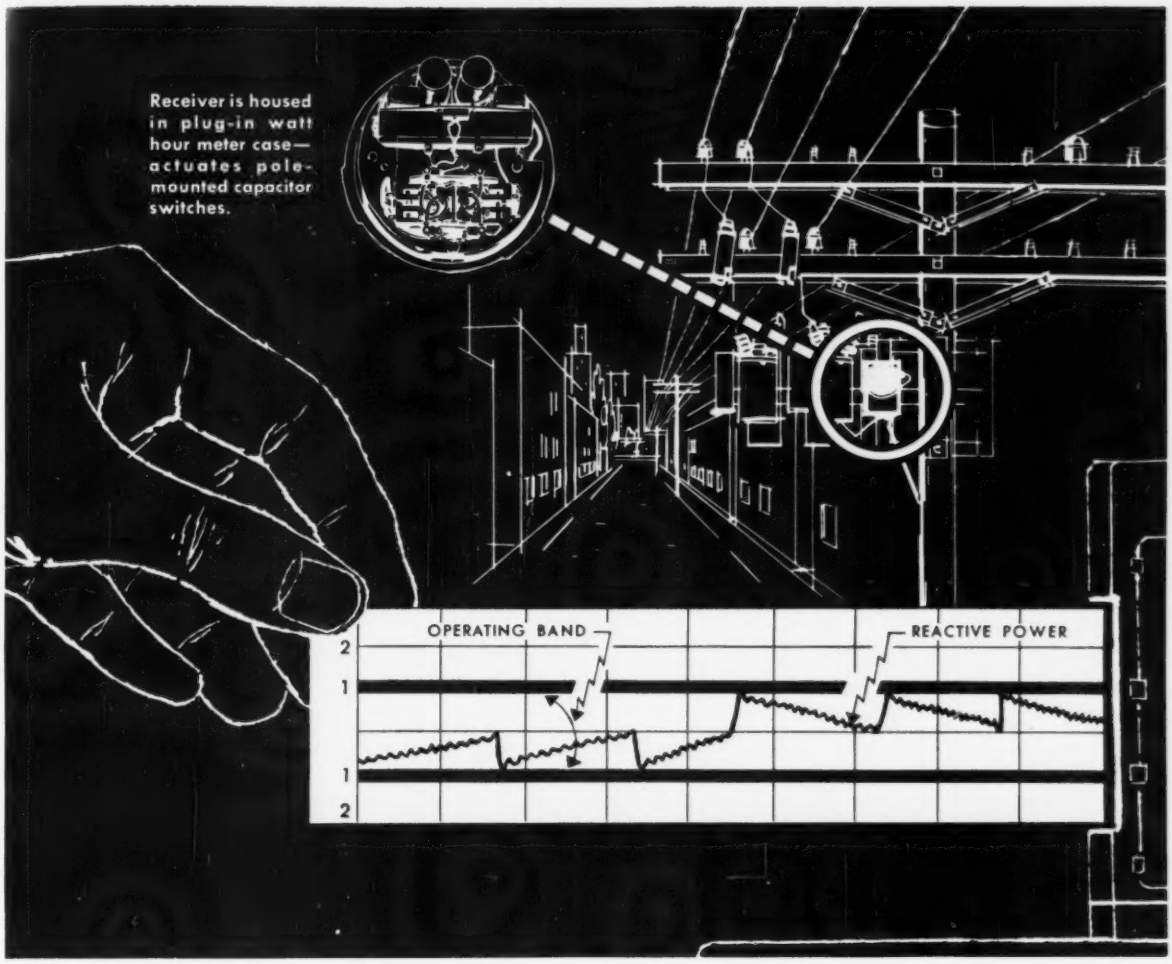


MOTOROLA *CENTRALIZED CONTROL* MAKES THE BIG DIFFERENCE IN AUTOMATIC CAPACITOR SWITCHING

Maintains system stability. Reactive power in the distribution system is kept within a narrow pre-set operating band. Substation equipment acts immediately to add or remove banks in a pre-set sequence. No local overcorrection is possible. An automatic system check assures maintenance of the desired status of all capacitor banks.

Achieves aim of conventional systems—overcomes their limitations. Motorola CC-10 Capacitor Switching, by continuous monitoring and switching capacitors when and where needed, maintains optimum power factor throughout the entire distribution system. Result: reactive current is reduced to a minimum; voltage is maintained at the desired value on a system-wide basis.

Lowers equipment and maintenance costs. Motorola CC-10 Capacitor Switching also allows you to maintain voltage without expensive tap-changing and regulating equipment. Because you can put more revenue producing kilowatts through your present system, expensive additional new construction can be deferred.

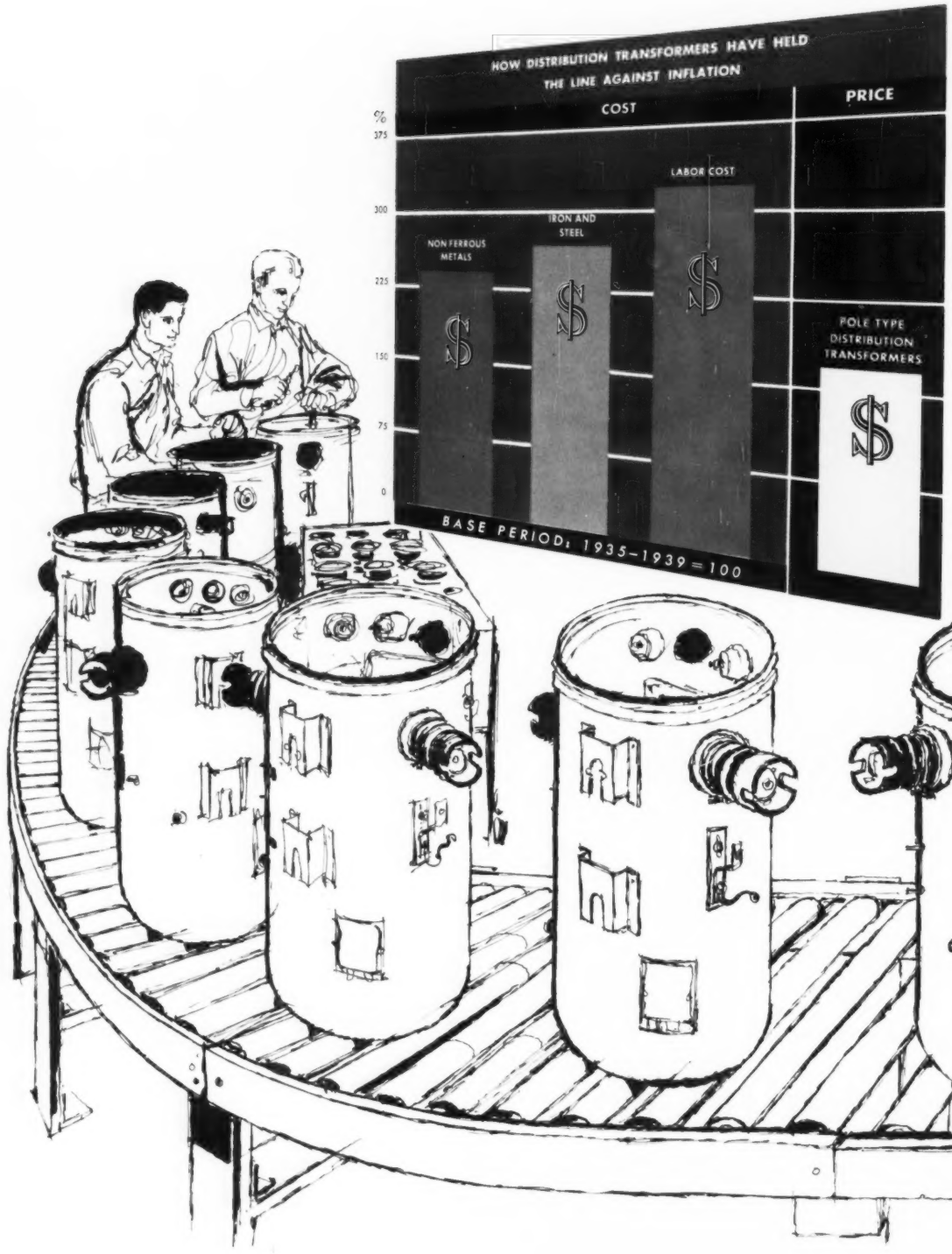
But that's not all. Pole-mounted receivers are fully *transistorized* for long, trouble-free operation. System security against false operation is a field-proven fact—components are Motorola designed and built for optimum continuous duty in power utility applications.

Write or call today for complete system information.

MOTOROLA CC-10 CAPACITOR SWITCHING

Motorola Communications & Electronics, Inc., 4501 Augusta Boulevard, Chicago 51, Illinois • A Subsidiary of Motorola Inc.

Before you buy another



ransformer... ANALYZE PRICE

General Electric keeps price down with standardization, volume, product innovation

Using the period from 1935 to 1939 as the base, nonferrous metals are up 139%, iron and steel up 174%, and labor is up 234%. Yet G-E pole-type distribution transformers are now up only 59%.

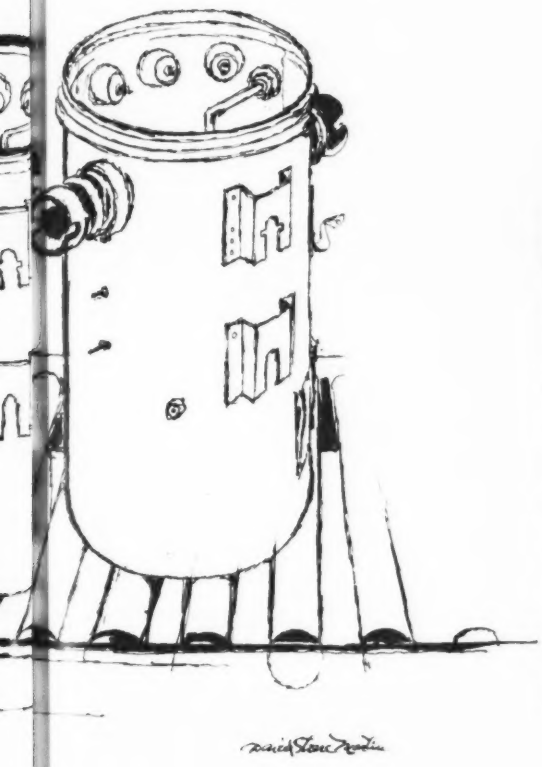
The cost of transformers remains comparatively low thanks in part to your increasing number of large-volume orders and to your support of standardization programs. Both contribute importantly to economical mass production.

Product innovations have also helped keep transformer prices down. General Electric's $1,000,000 development of grain-oriented strip steel, for example, has resulted in an estimated saving of over $300,000,000 to utilities since the steel was introduced twenty years ago.

Before you buy another distribution transformer, analyze price—give your transformer manufacturer credit for the extra values he gives you. General Electric Company, Schenectady 5, New York. 431-82

Progress Is Our Most Important Product

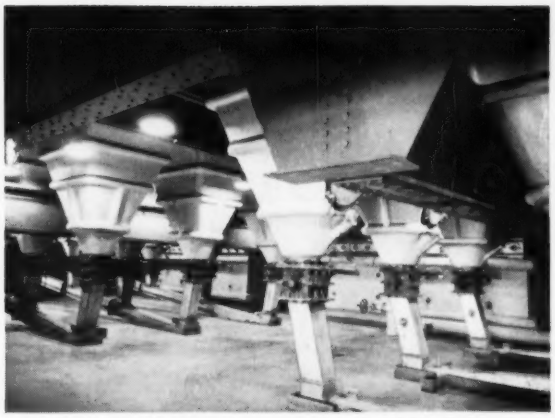
GENERAL ELECTRIC



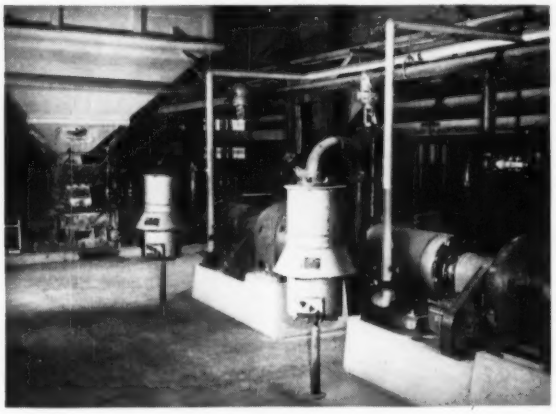
GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU		G.E.	OTHER MFRS.			
MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
CHECK SERVICE—24-hour shipment? repair and uprating? emergency assistance?						
COMPARE FEATURES—how many exclusive features in terms of longer life; reliability; easy maintenance?						
ANALYZE PRICE—does Co. hold line against inflation with significant product developments?						
EVALUATE INNOVATIONS—has Co.'s research paid off for you? Recent examples?						

FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

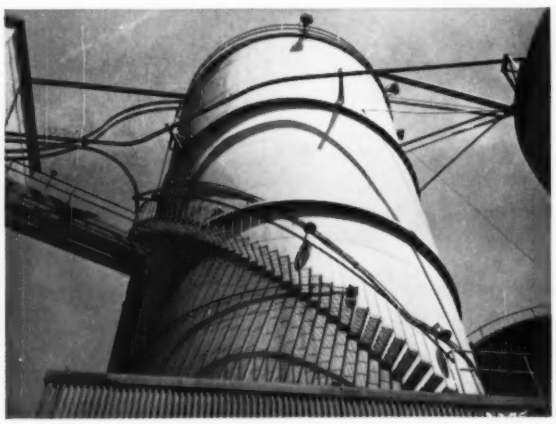
How Commonwealth Edison Turned a Fly Ash Problem Into Profit



F-H AIRSLIDE FLUIDIZING CONVEYORS ANGLE DOWNWARD from precipitator hoppers, move air-activated ash to 20-ton central surge hoppers under floor. There are few moving parts.



FULLER-KINYON PUMPS AND COMPRESSORS under surge hoppers propel ash to bins and silos at 20 tons an hour. Fluidized by air, the abrasive, 300°F. ash moves without injuring system.



BULK SILOS receive air-conveyed ash through Fuller-Kinyon pipe-lines. Farthest silo is 1,000 feet from pumps. Over 50% of fly ash is bagged and sold as a by-product.

At Commonwealth Edison's State Line Station, about 350 tons of fly ash a day had to be wet down, loaded, and trucked to suitable dumping sites.

Waste becomes profit. Today, the plant burning a peak load of 5000 tons of coal daily collects dry fly ash automatically in a totally enclosed Fuller-Kinyon system. The ash is conveyed from precipitators to storage bins and silos, where it's sold as a by-product. Manpower: just three men, one at the main control panel and two bagging the ash.

Air and gravity do the work. F-H Airslide® conveyors fluidize dry fly ash by a column of low-pressure air for easy movement by gravity to central surge hoppers. Then, a Fuller-Kinyon pump under each hopper drives the ash by air through a five-inch line to storage. The system is practically maintenance-free. There are few moving parts to foul or wear out.

Large and small plants can get the benefits of Fuller-Kinyon fly ash handling. Capacities range from 100 to 8,000 cubic feet an hour. F-H Airslide and Fuller-Kinyon conveying lines can be curved to avoid beams and other obstacles. Low-pressure air provides power inexpensively and installation costs are significantly less than other types of conveying systems. Write for detailed information in Bulletin FF-49-1.

1335A
G-203 A

Fuller
....pioneers in harnessing AIR

FULLER COMPANY
173 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
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FULLER COMPANY GENERAL AMERICAN TRADE MARK

VICTOR SUSPENSIONS

MEAN BUSINESS

VICTOR NO. 900
Suspension Insulator

REDUCTION OF OUTAGES— GOAL OF EVERY POWER MAN

Outages cost money to yourself and your customers. To help reduce outages, VICTOR goes to great lengths. We manufacture and test our suspensions with the industry's most modern equipment. We make them of Purified Porcelain—the toughest insulator porcelain ever made. We make our own glaze to be sure it conforms to VICTOR's high standards. We use premium grade insulator cement to join cap and pin to the shell. We subject them to grueling mechanical and electrical tests far above the required EEI-NEMA values. The result of these "beyond-the-call-of-duty" procedures is an in-built margin of safety that safeguards continuity of service on your lines.

ISOLATION WARD

To maintain the supreme quality of Purified Porcelain, each shipment of clay, flint and feldspar is thoroughly analyzed by VICTOR's ceramic laboratory technicians and then stored in individual bins. From laboratory analysis, the ceramic engineer is then able to compound a mix to conform with the master formula for Purified Porcelain. That is why each insulator is identical with each other — why VICTOR insulators are completely uniform — look alike, perform alike, have the same long service life. It is also a big reason why Purified Porcelain is the finest insulator porcelain ever made!

VICTOR GAVE BIRTH TO AN INDUSTRY— BACK IN 1893

The village of Victor in western New York State (17 miles southeast of Rochester) is the birthplace of wet process high voltage porcelain insulators. Practically all wet process porcelain insulator plants in this hemisphere have sprung directly or indirectly from the plant started in Victor.

From its beginning, VICTOR has always considered porcelain insulator-making as a science. The men and women who work at VICTOR are true craftsmen. Their duties call for a high degree of skill and knowledge. Today, VICTOR's devotion to the high standards of quality has made possible a perfection and uniformity of product which is the envy of all in the insulator field.

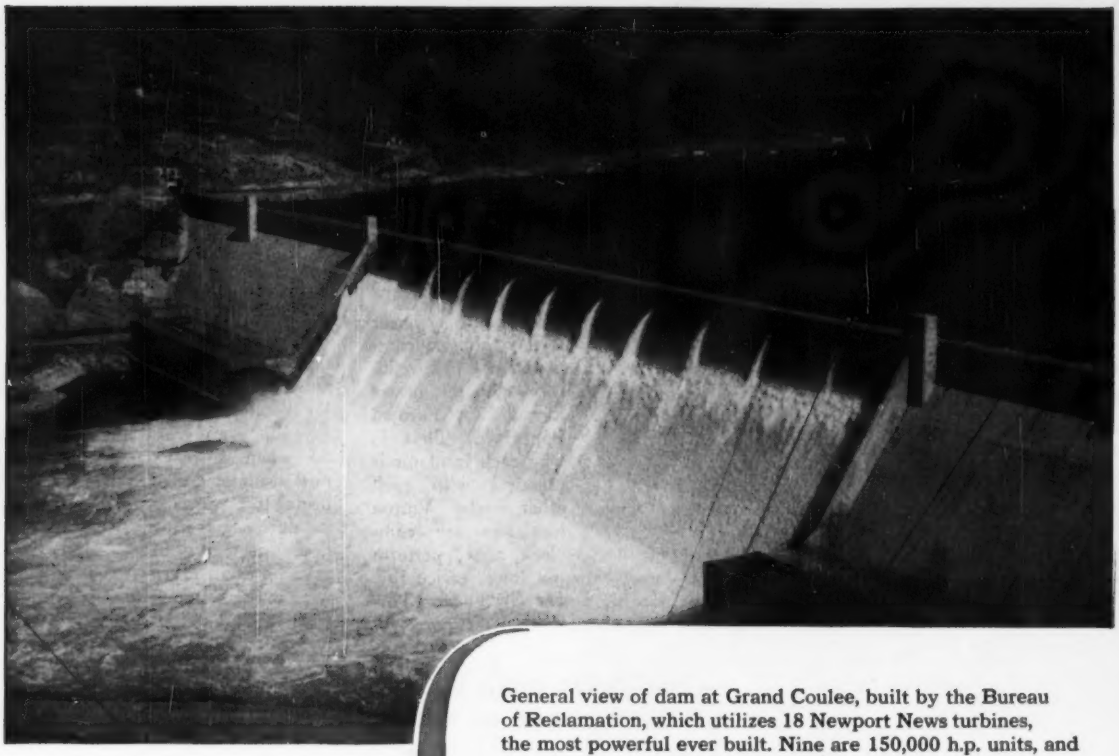
IDEA THAT CLICKED

The insulator business isn't like the automobile business. We don't put out a new line every year. So when a really new insulator design begins to take shape in our engineering department, all of us get a bit excited. We were excited enough when the drawings for the VICTOR NO. 961 FOG-BOWL SUSPENSION were ready for the initial factory run. But we are even more excited over the enthusiastic reports we are getting from customers who have put them into service on their lines. Here is a totally different but effective answer to the problem of insulating in areas suffering from the contaminating effects of salt-laden air, fog, smog, chemical or industrial fumes.

For full details and specifications on VICTOR Suspension Insulators write I-T-E Circuit Breaker Company, Victor Insulators Division, Victor, N. Y.

VICTOR NO. 961
Fogbowl Suspension Insulator

I-T-E CIRCUIT BREAKER COMPANY
VICTOR INSULATORS DIVISION



General view of dam at Grand Coulee, built by the Bureau of Reclamation, which utilizes 18 Newport News turbines, the most powerful ever built. Nine are 150,000 h.p. units, and the other nine are rated at 165,000 h.p. each.

Specialists . . . in building Water Power Equipment

Typical Users of Newport News Equipment

PLANT	LOCATION
Boone	Tennessee
Buchanan	Texas
Caonillas	Puerto Rico
Chief Joseph	Washington
Clark Hill	South Carolina
Deer Lake	Newfoundland
Folsom	California
Fort Patrick Henry	Tennessee
Hiwassee	Tennessee
Hoover	Nevada
J. H. Kerr	Virginia
Jim Woodruff	Florida
Lower Salmon	Idaho
Norris	Tennessee
Rock Creek	California
Santee-Cooper	South Carolina
C. J. Strike	Idaho
Whitney	Texas
Wilson	Alabama

Engineers . . . Desirable positions available at Newport News for Designers and Engineers in many categories. Address inquiries to Employment Manager.

Turbines designed and built for the world's largest development at Grand Coulee... and for other hydroelectric installations in America and various parts of the world... bespeak the skill and facilities offered by Newport News.

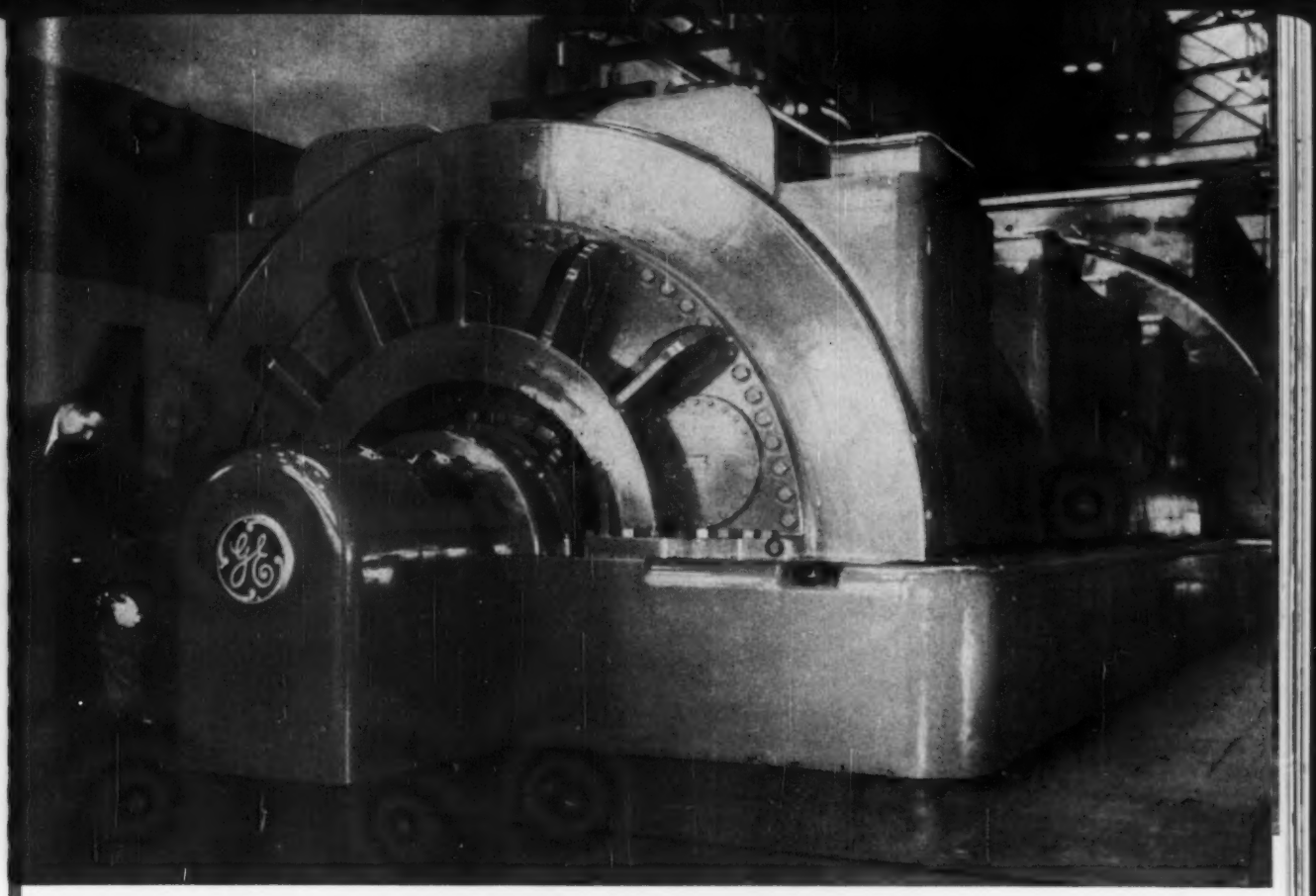
This trained organization has filled hydroelectric turbine contracts with an aggregate rated output of 7,000,000 horsepower.

Other equipment designed and built by Newport News includes penstocks, pressure regulators, valves, pumps, gates and rack rakes. Upon request, a copy of our illustrated booklet entitled "WATER POWER EQUIPMENT" will be sent to you.

Newport News

SHIPBUILDING AND DRY DOCK COMPANY

Newport News, Virginia



Philadelphia Electric selects Gulfcrest® oil to lubricate its new 175,000 kw generator

With the addition of a new 175,000 kw turbo-generator at the Schuylkill Station, Philadelphia Electric Company has boosted its system capacity to 2,712,250 kw.

Gulfcrest is the lubricant for many Philadelphia Electric generating units, to the complete satisfaction of this prominent utility. On the basis of their fine experience with this oil, Gulfcrest was chosen as the lubricant for the new #1 Schuylkill generator, which now has approximately 15,000 gallons of Gulfcrest 44 in its lubricating system.

The new unit is a 175,000 kw tandem-compound turbo-generator operating at 3600 rpm and under 2400 lbs. steam pressure. It is one of the largest and most efficient single shaft turbines in operation today.

Philadelphia Electric, like other utilities using Gulfcrest in their turbines, can expect many years of service from this oil—with neutralization numbers remaining consistently low, and systems free from sludge and rust. No wonder that in Gulf's marketing area, more power is generated by central station steam turbines lubricated with Gulfcrest than with any other oil.

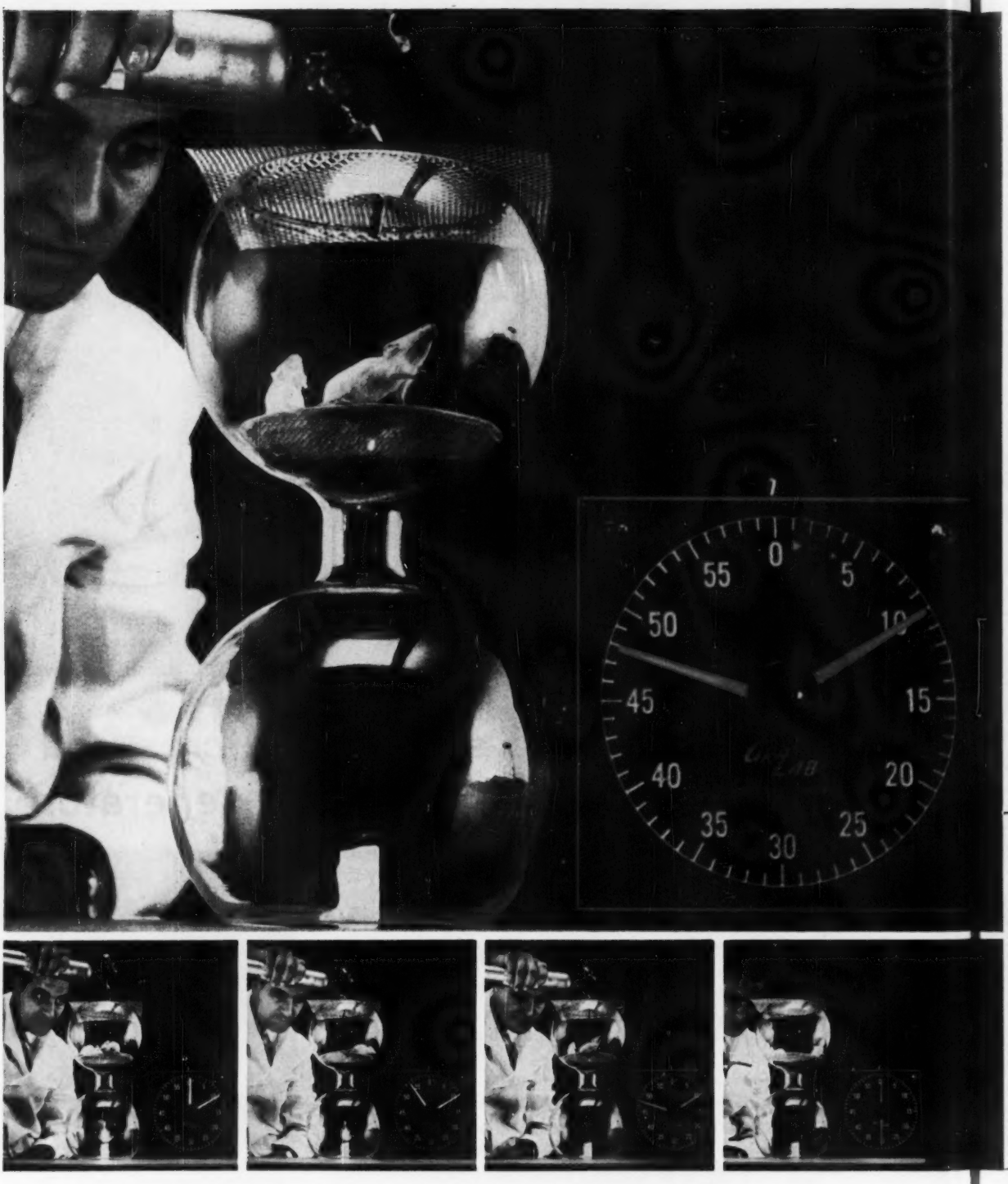
For more information on Gulfcrest, just call your nearest Gulf office or write for illustrated booklet.

Checking oil temperature in #1 Schuylkill unit at Philadelphia Electric are, left N. L. Gregg, Jr., Gulf Sales Engineer and George Hockenbury, Turbine Operator.

GULF OIL CORPORATION • Dept. DM, Gulf Building, Pittsburgh 30, Pennsylvania

GULF

GULF MAKES THINGS RUN BETTER!



THIS SIMPLE TEST, USING TWO MICE AND A CANDLE, PROVES SF_6 GAS IS COMPLETELY INERT... NONFLAMMABLE, NONTOXIC, SAFE

In this demonstration, time clock is set for 10 minutes, and SF_6 gas is released into top chamber containing mice. Heavier-than-air SF_6 engulfs animals and sinks to bottom chamber, snuffing out candle. Final frame taken 9½ minutes later shows mice in excellent condition. Laboratory tests have shown animals can live in a mixture of 80% SF_6 gas and 20% oxygen for 24 hours without ill effect. Even after repeated arcing in high-power laboratory tests, SF_6 gas is handled without special precautions.

Inert SF_6 gas boosts breaker safety

Makes possible greatly improved performance from 34.5 kv to 460 kv and beyond

A truly unique quality of SF_6 gas as a circuit breaker arc-quenching medium is its inertness. This quality promises safer power breakers . . . as well as breakers that are easier and less expensive to install, to operate and to maintain. The nontoxic, nonflammable properties of SF_6 gas are demonstrated in the photo at the left. In the future, Westinghouse SF_6 circuit breakers, even at extremely high ratings, will be applied in all substations including urban with perfect safety. Quiet operation is assured by the closed gas system.

In addition, SF_6 is highly stable . . . assuring long life of the gas as both an arc-quenching and an insulating medium, even after repeated interruptions. SF_6 (sulfur hexafluoride) has high dielectric strength, recovers full dielectric properties rapidly . . . assures unexcelled arc extinction time after time. Because of the design flexibility offered by this new medium, Westinghouse is now able to bring you equipment that combines the advantages of both oil and air breakers, as well as further advantages offered by neither.

Westinghouse power circuit breakers using SF_6 gas are basically new breakers. But they have proved themselves at several voltages and also promise the most practical design avenue in capacities of 460 kv and beyond.

Westinghouse suggests you buy two of these new breakers in widely separated ratings and apply them in entirely different operating situations. Prove to yourself that they will give you combined performance and economy you cannot get in any other breaker.

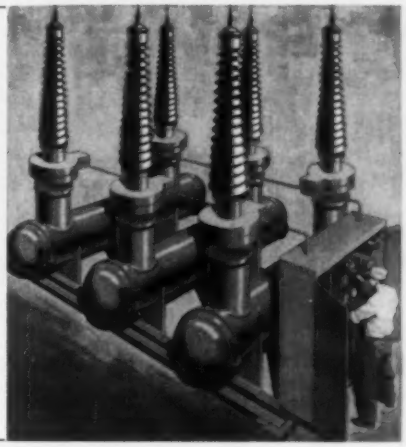
Call your Westinghouse representative today. Or write: Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-60982

PROVE THE OUTSTANDING PERFORMANCE OF THIS BREAKER ON YOUR OWN SYSTEM

The principle of circuit breaker design using SF_6 gas has already been proved successful on several operating systems. Breakers from 46 kv to 115 kv have now completed over two years of service.

With SF_6 breakers you get: FAST INTERRUPTION; EASY INSTALLATION; SIMPLE, LIGHT FOUNDATIONS . . . no ground shock during interruption . . . elimination of oil and size reduction cuts weight up to 65% at 230 kv; DRASTICALLY SLASHED MAINTENANCE . . . SF_6 does not decompose . . . interrupter easily removed; COMPLETE SAFETY AT ALL TIMES . . . dead tank construction; QUIET OPERATION . . . no discharge to atmosphere . . . closed system conserves gas.



YOU CAN BE SURE... IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

NEW PRE-FAB SUBSTATION UNIT

New L-M Feeder-Pak® Provides Compact, Low-Cost, Low-Voltage-Side Unit

Shipped in pre-wired, assembled sections, ready for fast, economical installation in substation as complete 15 kv feeder unit.

by **W. V. SWAN,** Product Manager
Power Switching Equipment
Line Material Industries

The new L-M Feeder-Pak is a complete unit for the low-voltage side of a substation. It provides support for feeder conductors, disconnect and by-pass switches, lightning arresters, current transformers, and substation-type R or W three-phase Kyle heavy-duty recloser.

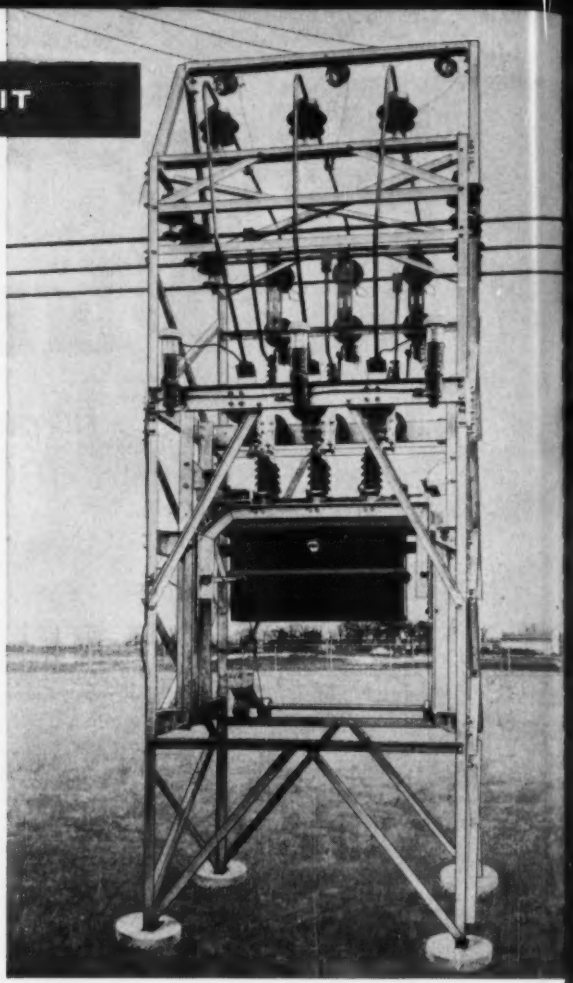
Neat, Compact

The unit has a very neat appearance. It is compact, easy to install. The whole unit comes in easy-to-handle crates. Additional units can easily be added when additional feeders are needed. Or units can be removed to other locations.

The Feeder-Pak costs about the same as the *materials* for a conventional open-type feeder position, but installation costs are far lower. Bus, insulators, switches, and arresters are all in place. No concrete pad is needed—only footings for the four legs. And it takes less land area—it's only 5 feet, 4 inches square!

Easy to Install

To erect the L-M Feeder-Pak, simply bolt the lower section to the concrete footings; set the upper section into the lower section and bolt; raise the recloser into position with the hoisting mechanism included in the lower section. Self-aligning bayonet-type contacts work automatically as recloser is raised into position. Automatic interlock prevents lowering the recloser until recloser contacts are opened.



THE NEW L-M FEEDER-PAK. The lower pre-assembled steel section contains the recloser, and recloser lifting frame and lifting mechanism. The unit is neat, compact. Base is only 5 feet, 4 inches square. It saves land, cuts installation and maintenance time. No mounting pad is required—just footings for the four legs.

L-M Feeder-Pak Features

1. With Kyle Type R or W recloser provides complete structure and equipment for low-voltage side of the substation.

2. Complete; compact; neat. Saves land costs; requires no pad; cuts installation man-hours.

3. Shipped as partly assembled units, crated for easy handling. Switches, arresters, and recloser disconnects are all pre-wired, and installed. Current transformers if desired.

4. Additional feeder positions are easy to add; or the Feeder-Pak may be removed to another location if desired.

5. Recloser lifting frame and tank lifting device make recloser maintenance safe and simple.

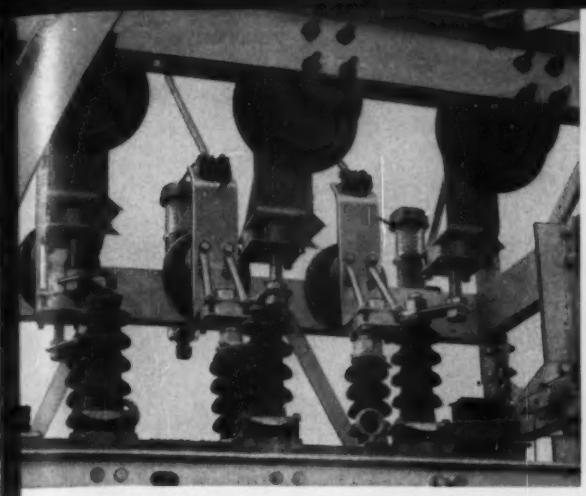
LINE MATERIAL® Industries
McGRAW-EDISON COMPANY

McGRAW EDISON

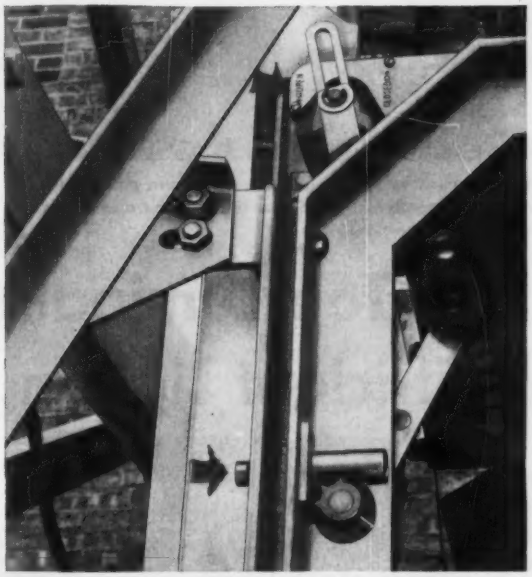
Substations and Power Switching Equipment®

399

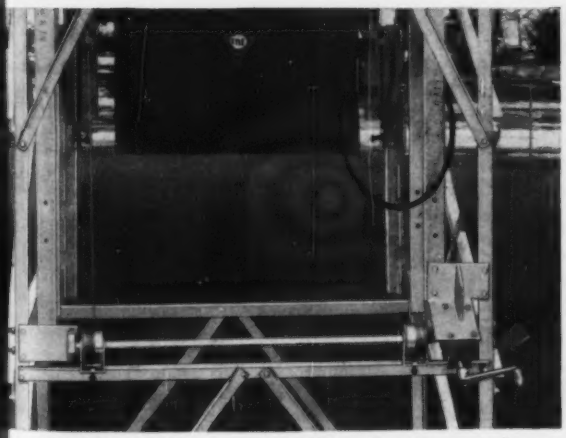
DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT



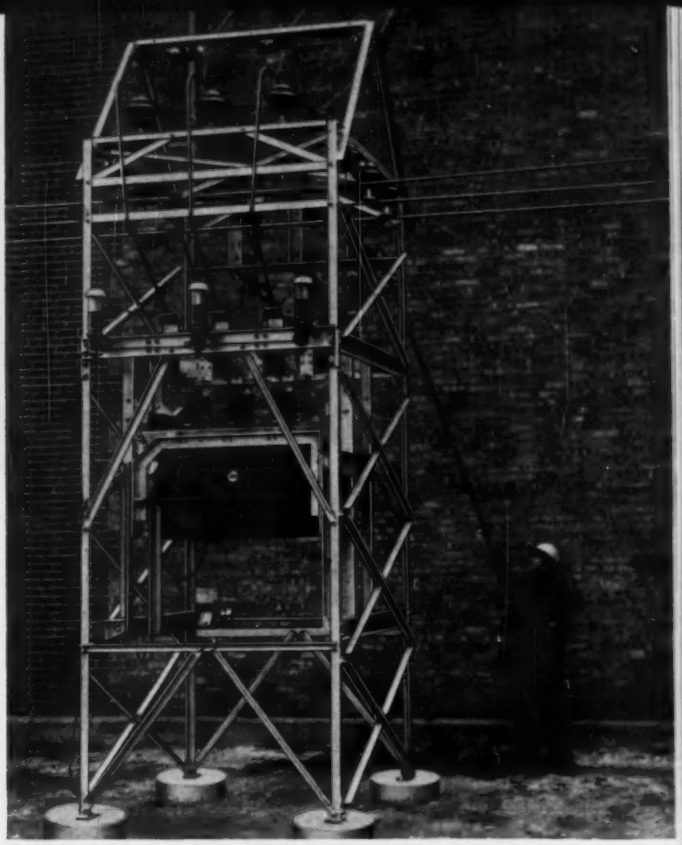
BAYONET CONTACTS on the recloser bushings are raised into the self-aligning automatic disconnects when the recloser is lifted into position. Thus connections are made safely, simply, and automatically.



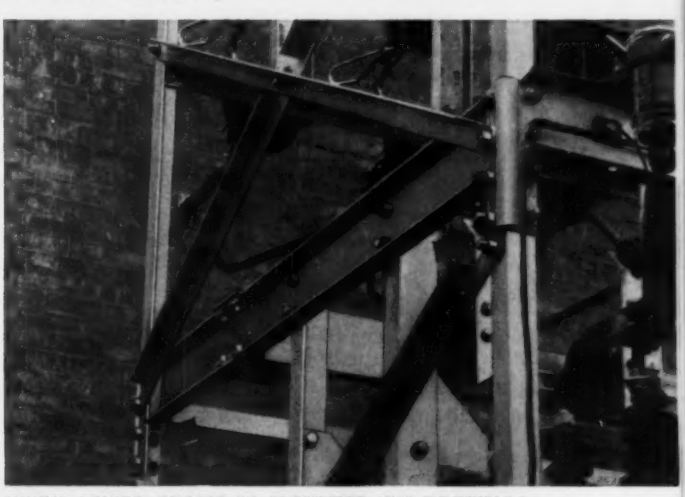
CONTROL LEVER INTERLOCK. Recloser cannot be lowered until recloser contacts have been opened by moving the handle down (arrow).



RECLOSER LIFTING MECHANISM makes it easy to lower the recloser, and, if desired, to lower the tank to inspect the mechanism, change coils or time-current characteristics —which is easily and accurately done on Kyle reclosers— or for periodic oil change.



LINEMAN CLOSES BYPASS SWITCHES before lowering the recloser. These are L-M Type HXO heavy-duty fused switches. They are mounted on the frame and connected to the bus at the factory.



WHEN LOWER FRAME IS MOUNTED ON FOOTINGS, upper sections are simply mounted into position and bolted to the lower section at the corners. This is all it takes to assemble the entire unit!

Get This Data on New L-M Feeder-Pak

Let us provide complete information on standard equipment and optional accessories. Then check your own present and proposed substation locations to see how this new L-M Feeder-Pak will save you money and man-hours, installation and maintenance. Talk to the L-M Field Engineer. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

L-M'S PTLs were used to light this enchanting scene at the Ann Morrison Memorial Park in Boise, Idaho. Eighteen equally spaced 300 watt incandescent PTL luminaires, mounted on 20-foot aluminum poles, provide soft, low-level lighting for the gardens and walks surrounding the pool.

Line Material's New Post Top Luminaire Combines Beauty and Efficient Lighting

Line Material Industries, one of the nation's leading manufacturers of outdoor lighting, has combined in the PTL (Post Top Luminaire) charming modern appearance with soft, even illumination. It is specially suited for parks, schools, playgrounds, institutional grounds, driveways, parking lots, bus stations, or wherever elegance and efficient lighting are desired.

The PTL incorporates a rigid spun-aluminum reflector, an efficient glass refractor, and a sturdy aluminum mounting base. The hinged reflector swings open for easy maintenance. It is available for mercury vapor or incandescent lamps in five IES light patterns.

Get Complete Information

L-M Bulletin 58203 completely describes the PTL unit. Get this bulletin, and complete information or engineering assistance on L-M's full line of outdoor lighting, from one of the 77 nationally located L-M Lighting or Field Engineers; or write Line Material Industries, Outdoor Lighting Division, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Division of McGraw-Edison Company (Canada), Limited, Toronto 13, Ontario.

THE PARKING AREA at New Orleans' fabulous Fontainebleau Motor Hotel is also lighted with Line Material Post Top Luminaires.

The new Line Material PTL is available in natural aluminum or in pastel colors for 3- or 7-inch diameter mounting. It is also available with photo control. 420

LINE MATERIAL Industries *Outdoor Lighting*

McGRAW-EDISON COMPANY

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS
POWER SWITCHING EQUIPMENT • PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING
LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

McGRAW EDISON

Editorial Comment

OCTOBER 12, 1959

The Price Line Bends

Over the past few months we've been reporting downward price adjustments across a wide band of electrical utility equipment. Among items thus far affected are steam turbine-generators; power, distribution and instrument transformers; capacitors; load interrupters; bushings; and street lighting equipment. Usually, the manufacturers who first initiated the adjustments have been joined quickly by their competitors.

With this broad range of products affected, a pattern has begun to emerge. There have been a few weak cries of "white sale," but these have died quickly as the pattern has established itself as an orderly one.

The theme of the price adjustment announcements has been that economies, presented by equipment redesign and/or new manufacturing methods, now permits passing on savings to the buyer. Usually, there has been strong emphasis on holding the price line into the future against the continued onslaughts of inflation.

Underlying the whole pattern, of course, is the normal domestic competitive situation, overlaid with strong concern about the growing movements of foreign manufacturers toward American power system operators.

Whatever the motivations . . . and they are complex . . . the builders of utility equipment are facing up to the implications of today's market.

They are to be commended for setting this pattern. Their example should be considered seriously by other segments of American manufacturing industry.

We sincerely hope their fight against inflation can be successful over the long term.

Electric Heating for Churches—Benefits to All

Electric heat for new church buildings can be rewarding for both the church membership and the utility serving it.

For the churches, electric heating offers several cost advantages. First, there is the low first cost and the savings to be gained by eliminating boiler rooms and chimneys. Second, there is cleanliness which should lower the maintenance costs of building interiors. Third, there is the area control of electric heating which enables the user to heat only the rooms being occupied. This is of special interest in many church buildings where the larger meeting rooms are used sometimes no more than once or twice a week.

For the utility, the most important advantage is the opportunity to educate community leaders on the feasibility of electric heat. Members of the building committee are usually chosen with a great deal of care because they are overseeing the expenditure of a relatively sizeable amount of money. In many cases they are the opinion leaders in a community. The information given them is sure to be shared in their daily conversations.

We know of no better way to spread the information about electric heating in a community than through such leaders.

The Public Looks Inside Dresden Atomic Plant

Six-month open house precedes fuel loading of Commonwealth Edison's 180-Mw project; school teachers serve as escorts for over 15,000 visitors

CONSTRUCTION CHIEF, F. A. Hollenbach, GE engineer, surveys the landscape in front of plant

Using a fresh plant-tour approach, Commonwealth Edison Co has just wrapped up a successful six-month open house at the Dresden Nuclear Power Station. The visits ended Oct. 3, a few days before fuel loading began.

The dual-cycle boiling water reactor was expected to achieve criticality this week, according to a spokesman of General Electric Co.

More than 15,000 visitors have looked inside the 180-Mw plant. Many of them came away no longer mystified by the art of producing power from the atom. And virtually all gained reassurance on the operation's safety.

Here are a few of the methods that lifted the open house out of the ordinary:

- Visitors toured through the buildings and around the facilities from 4:15 pm to 8 pm so that daytime construction was uninterrupted. On weekends, the hours were 9:30 am to 3 pm.
- Word-of-mouth advertising orginated with district superintendents and commercial managers who spread the news to civic clubs. Club members passed the word on to friends and, particularly, to schools.
- High school teachers, bolstered by a day of classroom and a day of in-plant indoctrination, escorted the groups. The crowds were handled by an average of 15 escorts, whose pay included time spent in training.
- A 2-minute sound-slide film

FLOW OF VISITORS hit peak over July 4 weekend. Tours were preceded by sound-slide film

gave visitors a preview of what was going to be seen.

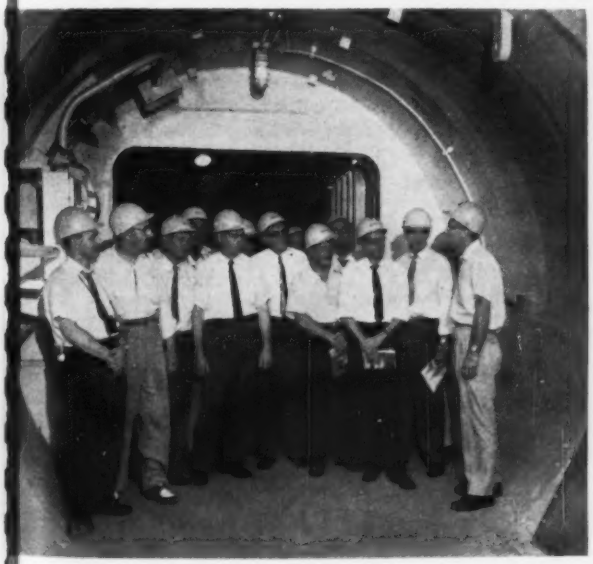
• Question-and-answer sessions followed the visits. Brochures on Dresden in particular and nuclear power in general were distributed.

The friendly welcome accorded by neighbors of the new plant has convinced Commonwealth Edison that the arrangements and efforts were worthwhile.

Among those taking the tour were special groups of American Institute of Electrical Engineers and Western Society of Engineers members.

Construction of the plant began early in 1957. The project is backed by Commonwealth Ed and the Nuclear Power Group, which consists of American Electric Power Co, Bechtel Corp, Central Illinois Light Co, Illinois Power Co, Kansas City Power & Light Co, Pacific Gas & Electric Co, and Union Electric Co.

Comonwealth Ed has spent $30 million on the project plus costs for the site and for overhead; its partners contributed $15 million. GE expenditures included $11 million for the project and $20 million for material and equipment.



CONTAINMENT VESSEL, entered through interlocking doors, was highlight. High school teachers escorted visitors

PLANT'S SAFEGUARDS were emphasized during visits, which ended Oct. 3, about one week before reactor went critical

HURRICANE GRACIE'S winds of up to 140 mph in Charleston brought looting safeguards. Two sections of 115 kv were knocked out here, three-fourths of 44-kv sub-transmission was lost in South Carolina E&G's southern system

Rebuilding Job Begins in Wake of De

Electric utility systems bore the brunt of vicious weather that hit sections of the U. S. the last of September.

The most devastating damage came in South Carolina Electric & Gas Co's area as Hurricane Gracie lashed in with winds up to 140 mph. Her path from Beaufort on the coast north through Columbia covered much of the company's 23-county territory. Except for a swipe at Georgia Power Co's Augusta and Savannah areas, she caused only minor damage on her swing north.

Pole-type transmission and virtually all distribution feeders were affected along the coast, SCE&G said. It was the worst storm in the company's history and marked the first time in the memory of present officials that the system's two major cities, Charleston and Columbia, were seriously hit at the same time.

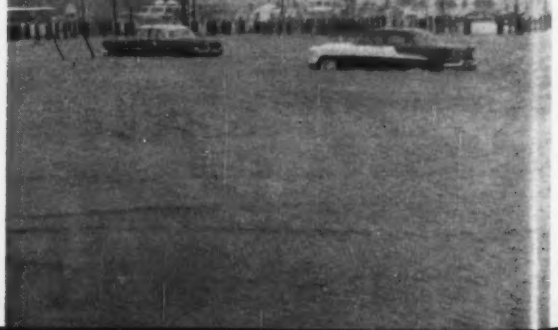
Some 30,000 to 35,000 customers were affected. Beaufort (pop. 5,081) and its surroundings were almost completely paralyzed. About half of Columbia (pop. 96,152) was without service and Charleston (pop. 70,174) was hit even harder. In some sections power remained off a week after the storm's Sept. 29 inland sweep.

With damage so widespread it was impossible to concentrate service crews at any one point. Georgia Power sent its own crews as well as contract crews in to help. Florida Power & Light Co and Duke Power Co also lent assistance.

At Electrical World's closing,

SAVANNAH suffered from Gracie's 60-mph force. Georgia Power lost 13 12-kv feeders and one 44-kv line in Augusta

CHARLESTON'S DAMAGE was increased by heavy rains that flooded numerous underground transformers



BIXBY, OKLA., FLOOD covered half of town 14 miles south of Tulsa. Oklahoma and Texas were hit by floods and tornadoes but utilities had only minor damage

Devastating Weather

most of the main trouble was cleared up. Steel tower transmission lines held fairly well and power plants escaped with only surface damage. No compilation was available on damage to facilities or on costs for repairs.

In Augusta, Georgia Power lost 13 feeder lines—all 12 kv—and one 44-kv line. These were repaired some nine hours after Gracie's exit there. Service loop breaks were caused by falling limbs and trees, not the high winds, GPC said.

A day earlier in Denver, snow began piling up on full-leafed trees. Within five days, 18 in. had fallen. An estimated 8,500 service loops were downed by breaking limbs and trees in the metropolitan area served by Public Service Co of Colorado. There were more than 225 breaks in 4 and 7.6-kv primaries and over 500 breaks in secondaries. As many as 19 feeders of 13 kv locked out at one time early Sept. 29.

With the efforts of more than 650 men, including 11 air-borne Utah Power & Light Co linemen, all primaries were repaired by Wednesday night on Sept. 30. By Friday morning, all emergency calls were fulfilled.

About one of every five Denver customers had interruptions of from a few hours to, in some cases, three days. About 35,000 customers in the city were affected. One damage estimate was over $250,000.

On Sept. 27 a severe rain and windstorm struck northwest Chicago and nearby suburbs. Commonwealth Edison Co reported 50,000 customers out of service at one time and estimated the damage would cost $400,000.

A total of 1,200 men were on the job during peak efforts to restore 4,000 downed wires, 90 toppled poles and 350 cases of trouble such as damaged transformers. The area's regular complement of 25 crews was supplemented by 65 other CE crews, 53 contractor crews, and five crews from Northern Indiana Public Service Co. All but isolated spots were cleaned up by early afternoon Sept. 28.

Utility damage from Southwest floods and tornadoes was light except for Pawnee, Okla., municipal system where outage lasted one day.

DENVER STORM piled up 18 in. of snow in five days. Trees and limbs broke 8,500 service loops, over 225 primaries and more than 500 secondaries. Estimated damage was $250,000.

230-Kv Link Slated for Arizona, Utah

Project could handle bulk of Glen Canyon output; $23-million system will move West closer to a regional network

A plan to connect the systems of Utah Power & Light Co and Arizona Public Service Co was announced on Oct. 1. The interconnection will involve a $23-million, 230-kv system that crosses the state line in the vicinity of the U. S. Bureau of Reclamation's Glen Canyon Dam.

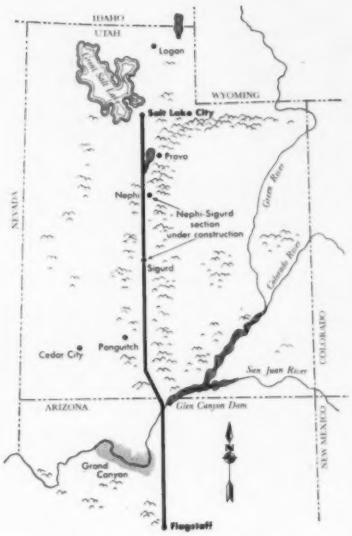
The 455-mile system will be an important leg in a presently evolving regional network which will tie in major steam generating plants with USBR's Glen Canyon project at the Utah-Arizona border and the Flaming Gorge Dam at the Utah-Wyoming line. Ultimately, the grid will link the Intermountain region with power pools of the Pacific Northwest and the West Coast.

E. M. Naughton and W. T. Lucking, respective presidents of the Utah and Arizona utilities, outlined the plan in conference with USBR officials in Salt Lake City. The company executives said the interconnection was in response to a promise made to the Interior Dept and Congress that such facilities would be built, and that they would serve preference customers where demanded.

May Avert Duplication

The Utah P&L-Arizona PS plan indicates their readiness to handle the bulk of power distribution from 900-Mw Glen Canyon. It also can deflate pressure for construction of federal transmission lines which would duplicate existing or proposed lines of power companies.

While construction of Glen Canyon stimulated the decision to build the connecting system, the plan is justified purely on mutual advantages to the two compaines, a spokesman said. Both 345 and 230 kv were considered, but 345-kv was rejected because engineering analysis showed one 345-kv line would be unstable—"there would be too many eggs in one basket"—and 230-kv construction is more economical, he said.



ROUTE of the proposed tie

Among the balancing factors to hydro output at Glen Canyon are the UP&L steam plant at Kemmerer, Wyo., with ultimate capacity of 500 Mw, and the availability of steam power from APS' Navajo project at Four Corners.

UP&L will construct 300 miles of the new 230-kv system at a cost of $15.5 million. This includes cost of its line now under construction between Nephi and Sigurd, to be operating next year. APS will build its 155-mile section from Flagstaff to the Arizona border for $7.4 million.

Systems' Peaks Differ

The Utah utility is a winter-peak system while maximum demand for APS comes during the summer. Load diversity promises economic advantages to customers of both firms, when the exchange becomes operative.

The 230-kv link will be completed before first production begins at Glen Canyon in 1965. The 974,000-CM line will have 175-Mw capacity to Salt Lake City and somewhat more capacity to Flagstaff.

A single circuit will be installed initially. Other circuits will be built as required by load growth. The use of the power companies' facilities to wheel energy from USBR projects, Naughton said, "will increase project revenues, reduce government expenditures, and thereby increase funds available for water (irrigation) projects" in upper Colorado River Basin states.

Representatives of Public Service Co of Colorado and Public Service Co of New Mexico were present at the Salt Lake City conference. In addition, Pacific Power & Light Co told USBR of plans for and work on interconnections with the bureau and other utilities.

One focal point of integration plans is at Four Corners. APS plans to build a 230-kv line from Flagstaff to Gallup and then to Four Corners, and two 345-kv lines from Four Corners to Phoenix.

PS of New Mexico will build a 230-kv line from Albuquerque to Gallup. In addition, UP&L and APS have suggested that the USBR construct lines from Four Corners to Glen Canyon and to Poncha Springs, Colo., near PS of Colorado transmission.

Pacific P&L's plans include a circuit in Wyoming from the vicinity of Pilot Butte through Riverton and Lander to a point near Atlantic City in Fremont County. "It is our intention to extend this 230-kv line from Atlantic City to the vicinity of Rock Springs before the middle of 1963," said PP&L's Wyoming general manager, Veryl Hoover.

Idaho Connection Planned

These lines would operate at 115-kv initially. At least one 230-kv circuit from Casper to Rawlins to Rock Springs and westward is planned to interconnect with UP&L and Idaho Power Co, Hoover said in a letter to E. O. Larson, USBR's regional director at Salt Lake City.

In another letter, Southern Wyoming Utilities Co stated it is willing and able to build a 230-kv line from Rock Springs to Flaming Gorge. It would be of sufficient capacity to transmit all power destined for delivery in this area. Initial operation would be 115 kv.

K. E. Darling, general manager for Southern Wyoming Utilities, stated that construction would be dependent upon receiving an allocation of Colorado River power of sufficient quantity to take care of estimated future requirements.

With an assist from Herbert Hoover . . .

And this objective for mid-1961 . . .

Ground Broken for Engineering Center

If rain makes things grow, the ground breaking ceremonies for the new United Engineering Center in New York City were a promising omen. Standing in the squalls from Hurricane Gracie's skirts, former President Herbert Hoover and Jerry Fujimoto, an RPI freshman engineering student from Hawaii, turned the first shovelfuls of earth for the $12 million structure in a ceremony symbolizing the continuity of past engineering accomplishments and those of the future. The center was construed as depicting the enduring vigor of the engineering profession to serve the nation.

The 18-story structure, a slim tower of glass, metal, and limestone facing the UN, will house 18 engineering groups representing 300,000 members when completed in 1961. The largest single venture undertaken by the engineering societies, it is designed to provide facilities for the even greater services the societies must render in the future. It includes office space, a meeting room for 400 people, several smaller conference rooms, an exhibit area, a cafeteria, and expanded facilities for the Engineering Societies Library.

The building will be owned and operated by the United Engineering Trustees, Inc. The UET is also conducting fund raising for the new building, with the aim of making it completely debt free. The goal is to raise approximately $5 million from industry and $3.8 million from individual members of 11 societies. Sale of the existing 57-year-old headquarters, built when total membership was only 16,000, will provide most of the remaining funds.

Of the five founder societies carrying the bulk of the member gift quota, the AIChE has shown the best results, having passed its $300,000 goal. AIEE, second, has about $110,000 to go. Then comes ASCE, ASME, and AIME.

Chalk Up Two for Peace River Project

The president of the Peace River Development Co, Ltd, has singled out two factors that promise to move the company's initial plans for hydro-electric projects in British Columbia a big step closer to reality.

The first, said Pres W. C. Mainwaring, is that "the feasibility report on development of hydro power on the Peace River will decidedly be favorable to the project." If the project is approved by the Canadian government, construction will begin in 1960.

Secondly, "recent studies of load growth in British Columbia indicates that no power need be exported to the U. S. to justify economical development of the project. This means that permission of the Canadian government will not be required to proceed initially.

The firm's proposal calls for first-stage development of 800 Mw at the Portage dam and, after completion of a second dam downstream, ultimate capacity of 3,145 Mw. Some 550 miles of 500-kv transmission line would link the projects with Vancouver.

These and related facilities would cost a total of $611 million of which $375 million would be raised first—after 1961—in Canada, Great Britain and the U. S. Financing is expected to be 50% bonds, 25% debentures and 25% equity shares, Mainwaring said.

Scheduled completion date for the two dams is 1976, but this date could be moved to 1973 if power load called for it.

His company is an affiliate of the Wenner Gren interests.

Powerscope

A Boom in Paradise

The Tennessee Valley Authority's first completely new power plant to be built since 1953 will be located in Paradise, Ky., about 85 miles north of Nashville. The $100-million station initially will house a 600-Mw turbine generator upon completion in September 1962. A second unit of the same size will be installed there a year or two later, said TVA chairman Herbert Vogel. Eventually, a total of four 600-Mw units will be installed, he said.

Paradise (pop. 65) is located on the upper edge of TVA's service area on the Green River. The town also is on the edge of western Kentucky's coal fields.

TVA has contracted with Peabody Coal Co to supply the plant with 65-million tons over a 17-year period at a total cost of $191,750,000. The pact appears to be the largest coal deal ever made. Cost will be $2.95 a ton, which is one-fourth less than TVA's average at other plants, and maximum haul of the coal will be 5 miles via truck.

General Electric Co is supplying the first unit for $18,007,280. Combustion Engineering Co is apparent low bidder on the boiler with a price of $13,986,720.

Residents in area were enthused about the effect the plant would have on the local economy, an economy which has suffered from a drop in population of 6,000 in Muhlenberg County during the past nine years. The owner of one of two stores in town put it this way: "It looked like there wouldn't be no more Paradise until now."

NRECA Denies Rumors

Rumors that National Rural Electric Cooperative Assn members would be loaned to campaign for Democratic candidates next year "have absolutely no basis in fact and are completely false," the group's assistant general manager declares. Joe Jenness made the statement in response to charges by Rep Richard Simpson (R-Pa.) (EW, Sept. 21, p 72).

Simpson's comments and a letter to NRECA General Manager Clyde Ellis were entered in the Congressional Record of Sept. 14. Acting for Clyde Ellis, NRECA's general manager, who is touring the U.S.S.R., Jenness said:

"We are not going to 'loan' any employees to any candidate, Republican or Democratic. Neither are we going to grant a leave of absence for any such political purpose. . ."

Duke Blasts Off

Duke Power Co, after an interval of 30 years since building a dam on its own, has taken on the construction program for the $62-million, 350-Mw Cowan's Ford Dam on the Catawba River. The only exceptions to the do-it-yourself approach are the consulting services of the Boston firm of Charles T. Main, and contracting for earth moving and dynamiting.

South Carolina Gov Luther H. Hodges officially got the project going with a dynamite blast Sept. 28.

The project will include a powerhouse automatically controlled by microwave from Charlotte, 15 miles away to the north and west. The utility will build a rock crushing and sizing plant to supply sand and stone via conveyor belts to the dam. Fly ash from Duke's steam stations will replace 30% of the cement in 350,000 cu yd of concrete.

C. T. Wanzer, chief engineer, will supervise the project. One of his assistants is W. S. Lee, grandson of the late William States Lee, who helped form the utility.

Not So Secret

The National Labor Relations Board held a secret ballot at Arizona Public Service Co's Phoenix headquarters recently, but the vote wasn't so secret.

Only one man voted. He chose to remain non-union.

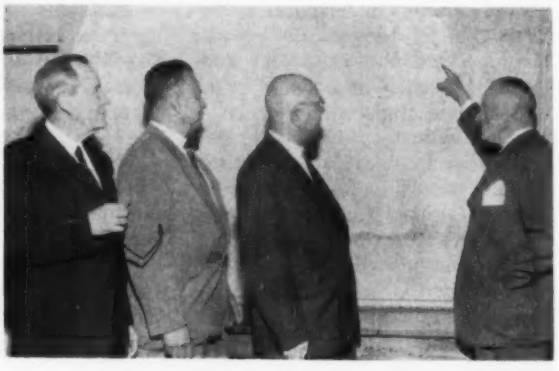
Laborers Local 383 (AFL-CIO) had petitioned the NLRB for an election among two APS janitors. After a Phoenix hearing, a board determination in Washington, D. C., authorized the election. Both janitors were eligible to vote, but only one showed up, said NLRB attorney J. W. Cherry, Jr.

Soviet Powermen Tour U.S. Utilities, Manufacturing Plants

After a delay, presumably caused by a conflict with Premier Nikita Khrushchev's U. S. visit, a dozen Soviet powermen began touring American systems and manufacturing plants Oct. 6.

H. L. Baumgardner, Detroit Edison, is pointing to some of the places where the Soviets will visit. Looking on (l to r) are: Edwin Vennard, Edison Electric Institute; N. P. Galochkin, chief engineer foreign department, ministry of power station construction, and K. D. Lavrenenko, first deputy minister of electric power station construction.

The itinerary includes New York, Newark, Philadelphia, Washington, D. C., Detroit, Philo, Cleveland, Denver, and Los Angeles.



Output Continues As Substation Is Rebuilt

R. V. **BRUCE**, Works Engineering Dept, Westinghouse Electric Corp, Sharon, Pa.

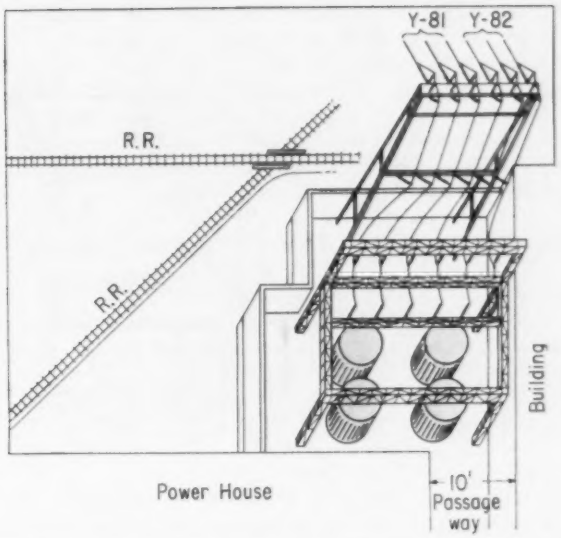


FIG 1—EXISTING 69-KV SUB, occupying only feasible site, was hemmed in on all sides, could not take 138-kv service

Build a brand new substation, on the same spot as the existing installation, without interrupting production. Provide enough flexability to take utility service at either 69 or 138 kv for an indeterminate period. And make all the necessary changes in service and connections in three 48-hr weekend shutdowns. Starting from scratch, finish the whole job—planning, designing, purchasing, and installation—in 16 months.

Impossible? Not with the careful planning and close coordination between supplier, utility, and user that Westinghouse developed in rebuilding the main substation at their Sharon, Pa. transformer plant.

Necessity mothered Westinghouse's ingenuity. When plant engineers discovered, in the summer of 1956, that their existing substations did not have enough capacity to handle the forecasted loads for 1957 and the future, it looked as though the problem could be handled by merely replacing the three 4-Mva single-phase transformers and a similar spare with units of larger rating.

Then the utility serving the Sharon plant found that it could not handle the expected load growth on existing 69-kv lines and would have to change its supply voltage to 138 kv. And since the new service would have to wait till the utility commission approved it, no definite changeover date could be established then. Immediately the system designers were faced with a multitude of problems:

1. How could the plant obtain adequate substation capacity for the spring and early summer months of 1957 if the season happened to be unusually warm or if the new installation was delayed?

2. The substation tower was designed for 69 kv and would not serve for a 138-kv system.

3. Where could the new substation be placed? The plant is penned in by a street and a residential section on one side, and by two different railway lines on the other side. The existing substation site would not accommodate an additional 138-kv substation and there was no available space in the plant. The plant was one mile long, which made it prohibitive to install a new substation at either end of the plant property.

4. The shop and office were in a period of high production and could not tolerate any shutdown of power facilities while the changeover was made.

5. During 1957 and early 1958 we must receive utility power at 69 kv. But any time thereafter we must be prepared to receive power at 138 kv. How should we proceed to operate from both voltages?

6. No matter what new problems arose to complicate the picture, no additional time could be allowed to take correction action.

Cooling Fans the First Step

The first constructive action taken was to install banks of cooling fans on all the radiators of the single-phase transformers in the existing substation. This would allow an overload above rated capacity, even if there should be an unusually warm spring and early summer.

There was no choice but to install a complete new 138-kv substation in the same restricted substation area that now served our plant. And to add to the problem, the only entrance to the substation area was a 10-ft wide, 105-ft long unsurfaced passage between two buildings.

To avoid any shutdown of power, it was decided to make the complete transformation in sequential steps, using two new 3-phase transformers which would ultimately be used in the new substation. By careful planning and coordination, shutdowns would be limited

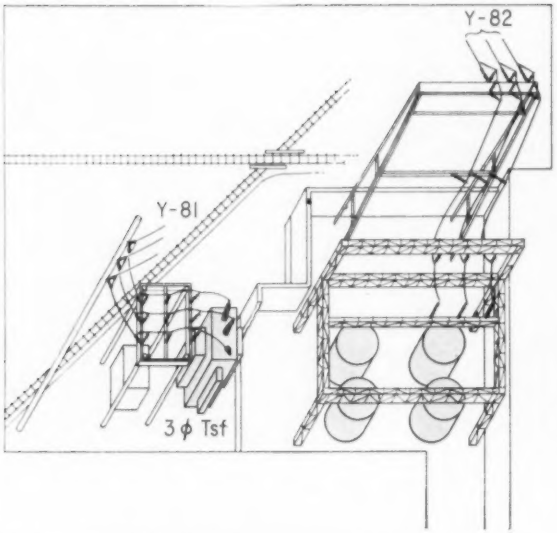


FIG 2—**TEMPORARY POLE-TYPE SUB,** using one 69-kv utility feeder and one new transformer, provides interim power

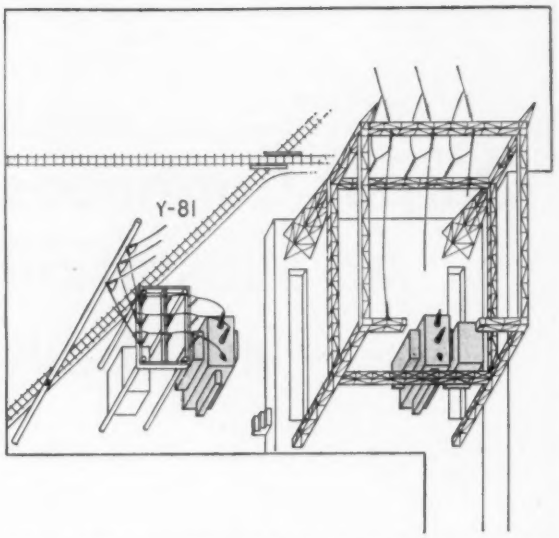


FIG 3—**OLD SUB IS TORN DOWN.** Second new transformer and its switchgear are installed, and 138-kv structure erected

to three 48-hr weekends. The transformers selected were two 138/69-6.9-2.3-kv, shell form type OA/FOA/FOA units. These were to be designed to pass through the narrow entrance to the substation area.

Since there were two separate 69-kv utility feed lines (designated as Y-81 and Y-82) serving our old substation, one of these could be used to feed a new temporary 69-kv pole structure substation which would be constructed in the south corner of the substation area. The equipment in this temporary station consisted of a 69-kv oil circuit breaker, one of the new 3-phase transformers—installed on a foundation built of ties to allow for the sloping surface—metering transformers, a 6.9-kv oil circuit breaker, and by-pass disconnect switches.

The first 48-hour power shutdown was made on a selected weekend, with a very closely coordinated schedule for all maintenance people involved. It was only by this pre-planned schedule that a completely successful switchover of power to the temporary substation was possible. The old 69-kv station was left in a cold state, but operable if trouble should develop in the temporary set up. Under these precautions, the job of enlarging the old substation pad area and installing a "north" and "south" cable pit from the substation to the powerhouse was begun.

These cable pits are considered one of the greatest improvements made in this entire project. Since there were to be two transformers, each capable of carrying the plant load, the banks were designated as "north" and "south" units. Each bank was to have its own 6.9-kv and 2.3-kv switchgear which would provide a parallel feed to the main feeder bus in the powerhouse.

Again restricted area conditions created a problem of how to feed from the new substation to the powerhouse. This problem was very simply overcome by installing duplicate outdoor metal-clad switchgear beside each of the two transformers, and ordering the switchgear for top feed into the units and bottom feed from the units. Two pits, five ft wide and eight ft deep, were constructed to run east and west along the full width of the substation and into the powerhouse basement. The tops of these pits were left open and provided with a two-inch-high curb to keep water out.

With this setup, all switchgear cubicles could be aligned over the pits and ample room would remain to install additional units of switchgear as the plant growth demanded. This planning for spare units was essential, since no space for additional feeder circuit breakers was available in our powerhouse breaker line up. The feed from the outdoor breakers to the inside main bus was made by 1000-Mcm cable, with four parallel cables on the 2.3-kv feed and three parallel cables on the 6.9-kv feed. These cables are supported by cable trough, hanging on the inside walls of the cable pits. This made a very neat installation.

Install New Grounding System

During the installation of the cable pits, a new grounding system was installed, the concrete pad for the station was enlarged and foundations for the new 138-kv substation structure were installed. These structural foundations had to be rather massive because the utility lines feeding the station had to cross both sets of railroad tracks.

With all of this ground work done, there was now room in the new area for the two transformers, the 6.9-kv and 2.3-kv switchgear, and the new 138-kv structure. However, there was not room for a 138-kv oil circuit breaker, the metering equipment, all the air disconnect switches, and the control house for this equipment.

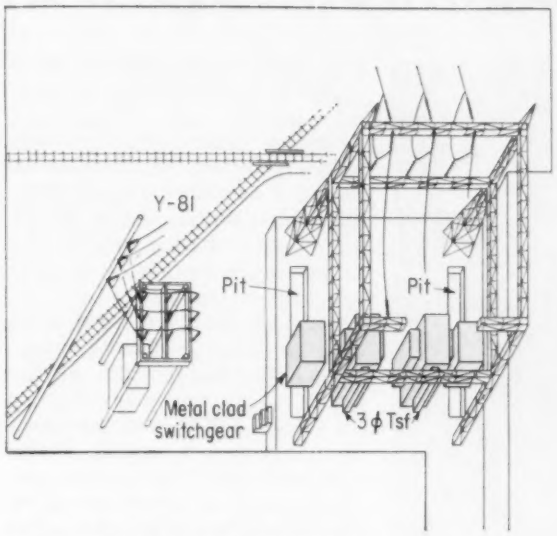


FIG 4—WITH PLANT NOW SERVED from one bank of new sub, other transformer is moved from temporary to final site

The power company was still faced with the problem of furnishing our plant with 69 kv until the utility commission could establish rates on the new 138-kv system, yet they must unload their 69-kv line.

To solve these numerous problems, the power company built a second 138-kv substation exclusively to feed the new station. In addition to provisions for the oil circuit breakers, metering equipment, control house and the disconnect switches, the utility site provided space for a 138-kv to 69-kv autotransformer, a unit which they anticipated needing for another location in a few years. This now accounted for all of the large equipment and space needed for the final power requirement.

As work progressed on this second substation, the four single-phase transformers and the two old 69-kv OCB's were removed from the old substation. Immediately, the second new 3-phase transformer was moved into the area to serve as an emergency for our temporary substation which had been doing a fine job of carrying our load.

Our project had now reached the critical period—the time when the second feed line (Y-82) must be cut, the old structure work torn down, and the new 138-kv structure erected. During this period the plant was entirely dependent on the temporary setup, with its single set of feed lines. Work on this part of the project was carried on around-the-clock until it was completed. This also included the stringing of the new 138-kv feed lines between the two new stations.

The "north" 3-phase transformer and its associated switchgear were installed in their final position. The time had finally come to operate the plant from one bank of the ultimate dual installation. It was now October and all had gone without serious troubles.

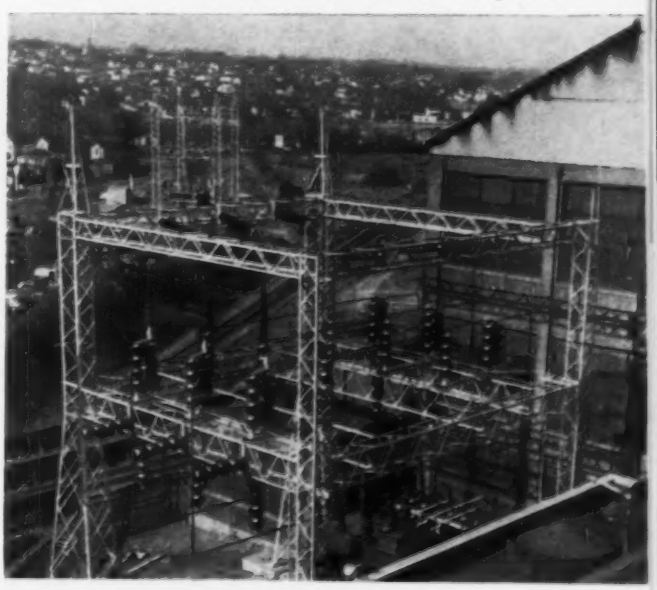
Again, a selected 48-hour weekend was chosen to minimize production interruptions. A tight, coordinated switchover schedule was made in detail and the "north" bank was put into operation. The efficiency of the maintenance department was such that on each of these two scheduled shutdowns the actual switchover time was less than 24 hours. This allowed ample time for checking control circuits and the new system under load conditions, without the possibility of hindering production.

After allowing one week for test operation under full plant load on the "north" bank, installation of the "south" transformer bank started. Since only one 69-kv power line (with 138-kv spacing) fed into our new 138 kv substation, the decision was made to leave the temporary 69-kv "pole structure" substation in operative position until the power company was able to complete installation of their new 138-kv line into the valley.

This was accomplished by removing only the metering equipment and the new "south" 3-phase transformer from the temporary station. The transformer was moved into its new permanent location and an aerial line was strung from the temporary station to the high-voltage bushing side of the newly located "south" transformer. Within a short time, all of the outdoor metal-clad switchgear was installed in its permanent location over the south cable pit.

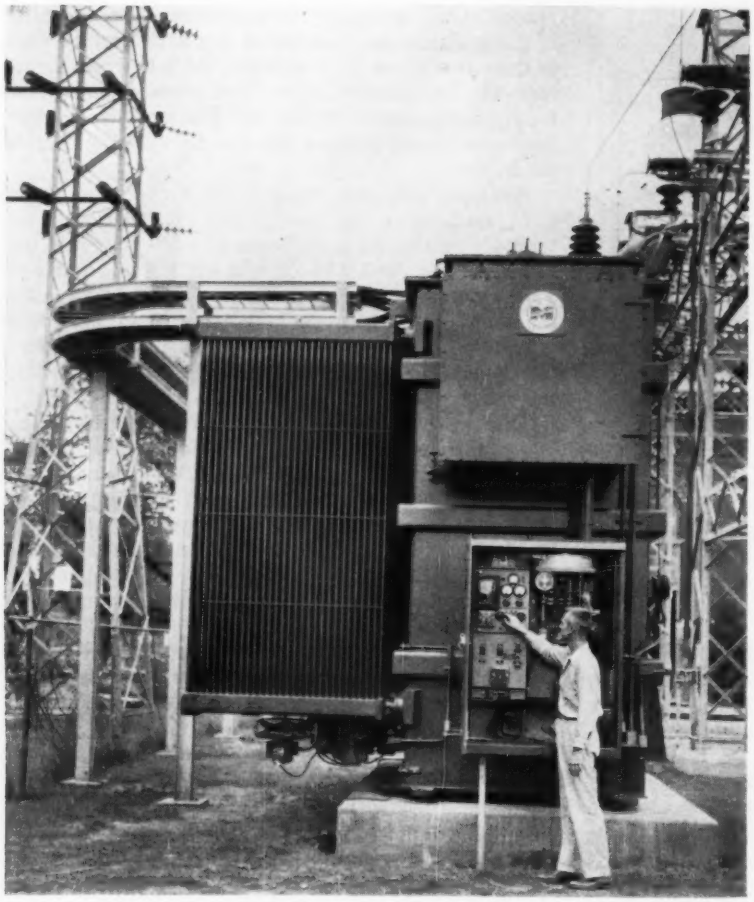
The second transformer was now ready to be energized. This, required a third shutdown, so the feeder lines could be tied into the main powerhouse bus and all control wiring could be made to the new control desk which was a part of this overall project. This third 48-hour shutdown was made during the first weekend of January 1958. Again through detailed planning all went well, without any serious difficulties.

FIG 5—UTILITY SUBSTATION with 138-kv breakers, autotransformer, and metering is shown in the background

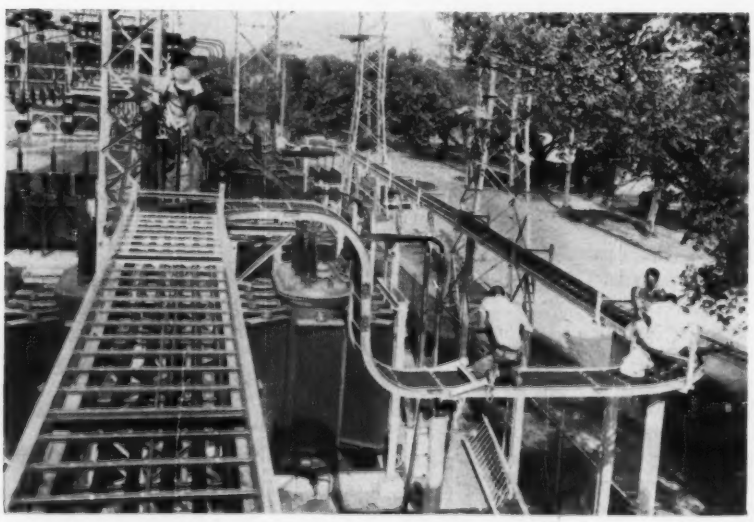


Plant Serving Downtown Network

H. J. **EGLE**, Engineer, Kansas Gas & Electric Co, Wichita, Kan.



NEW TRANSFORMER installed in the Wichita station switchyard is 20,000-kva, 69/4.16-kv LTC type and cable connections to it are on special cable racks



CABLES are being clamped to special roller-coaster type racks. They join LTC transformer to the new 4.16-kv switchgear on the station's third floor

Several system changes were necessary before Kansas Gas & Electric Co could shut down generators at old Wichita station and put the plant on standby service. But savings in operating cost were well worth the expense.

Although the units were small and, by today's standards, uneconomical, they had provided capacity for and had regulated voltage to the western half of Wichita's downtown underground network. System studies showed, however, that putting the plant on standby would reduce annual operating cost by more than $200,000. Total cost of the system changes involved was about $244,000.

Transformer Installed

To provide the needed capacity and voltage regulation, a 20-Mva, 69/4.16-kv LTC transformer was installed in the west switchyard at the plant. A roller-coaster-like cable rack supports the cable connections between the transformer and the new 4.16-kv switchgear on the third floor of the plant. The new switchgear, consisting of one 3,000-amp main breaker and six 1,200-amp feeder breakers, was placed on the third floor for these reasons:

1. Space was adequate.

2. The switching structure for the primary cables to the underground network is there.

3. Only a short section of cable extends the primary cables to the new switchgear.

The plant's old 4.16-kv bus and some old switchgear serve as a standby for the new equipment. Some of the oldest breakers with low interrupting capacity were retired.

Installing cables between the switchgear and the LTC transformer in underground ducts, or using overhead bus duct were investigated. The cable rack installation proved to be the most practical and economical.

Total length of the run is about 375 ft. In the substation yard, height above ground is 14 ft. An increase in elevation of 6 ft gives a

Revamped for Standby Operation

20-ft clearance over the driveway near the plant building. A special truss supports the racks over this section, one end supported by a steel tower and the other by the plant building.

The aluminum cable racks are 24 in. wide and have 4-in. side channels. Rungs on which the cables are supported are spaced 9 in. apart. Vertical separation between the two racks is 13 in. Supports for cable racks in the substation yard are 6 by 6 in. wide flange galvanized steel beams set in concrete bases.

The circuit is 3-phase, 4-wire wye. Cables are single conductor 1,000 MCM, 5 kv, compound-insulated, shielded, with asbestos braid jacket. Four cables per phase result in a total capacity of more than 3,100 amp per phase. Six cables were installed in each rack with phases arranged ACBBCA. This symmetrical arrangement keeps the maldistribution of current among cables of the same phase to a minimum. Measurements taken after they were put in service showed that the cables carry equal current.

Neutral Bare Aluminum

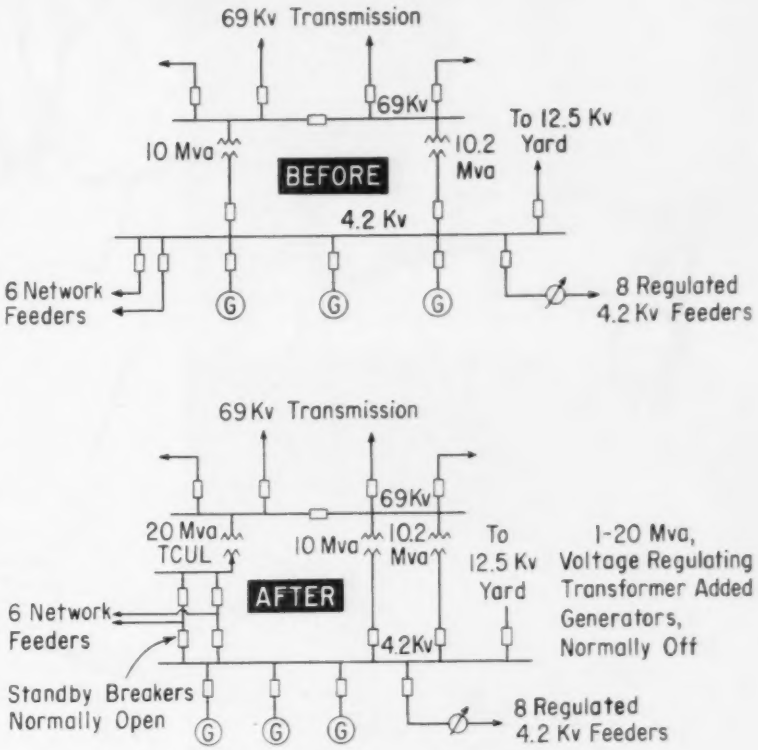
A 336.4-MCM bare aluminum neutral was installed in each rack to provide low impedance to fault currents and thereby reduce arcing or burning at rack junctions and supporting members. The neutral terminates at the transformer and switchgear.

Cables are held in place on the rungs by ¾-in. wide aluminum clamps, spaced about 5 ft apart on horizontal sections of the run and 18 in. on vertical sections and bends.

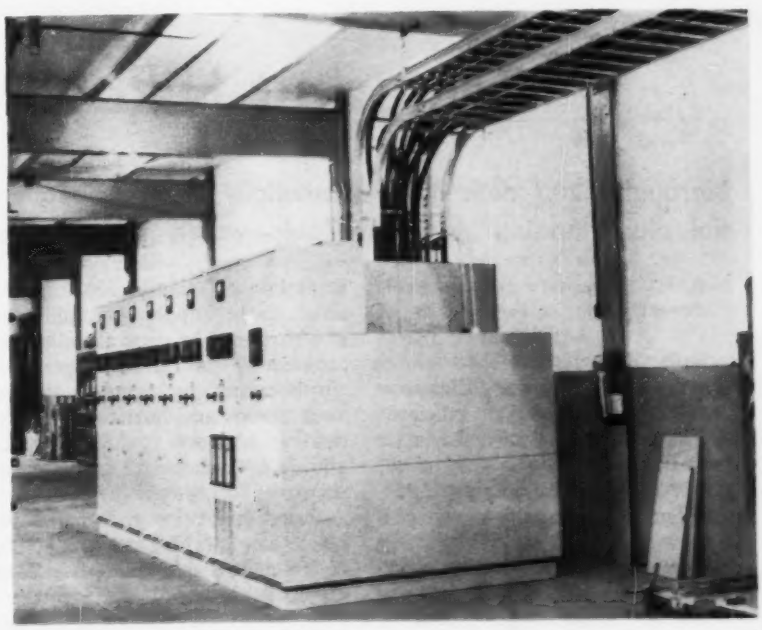
To pull cable into the racks, a winch truck was stationed at the east end of the plant building. The pulling line was threaded up to the third floor and over the cable rack to the west end of the run, where the cable reels were set up in the substation yard. To pull the cable around the 90-deg bends, three-wheeled pulleys were used. These provided a turning radius of 24 in.

No effort was made to make the cable follow the exact vertical layout of the racks. It was pulled diagonally between points of varying

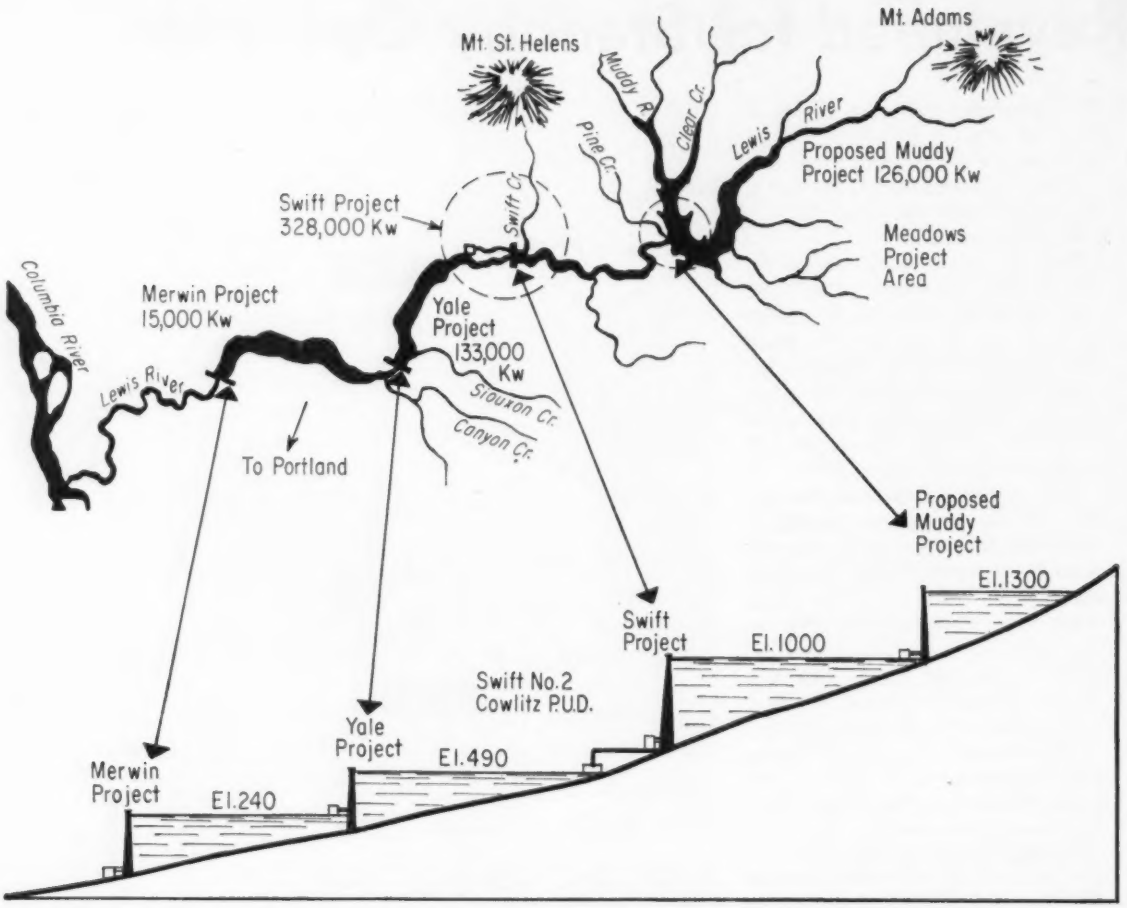
(*Continued on page* 112)



NEW CABLES join 20-Mva LTC transformer in the yard with the new switchgear on the third floor of Wichita steam station, in scheme putting plant on standby



NEW SWITCHGEAR, required for changing plant to standby operation, consist of a 3,000-amp main breaker and six 1,200-amp feeder breakers, all in cabinets



LEWIS RIVER is water source for Pacific Power & Light Co hydro plants which now number four. Two other power-houses are proposed. With reservoirs full, maximum capability is 611 Mw. River development is shown in profile

Computer Hikes Plant Efficiency,

Burrough's 205 does mass calculations involving sequential plant loading steps, available water, power rates

J. D. ELLIS, Operating Engineer, Pacific Power & Light Co, Portland, Ore.

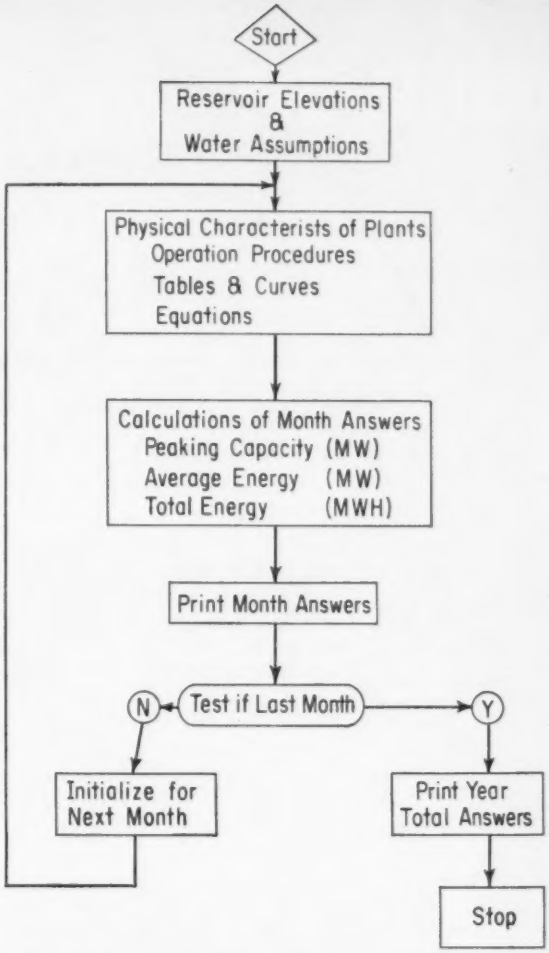
Rule curves developed on a Burrough's Datatron Electronic Computer improved plant efficiency and gave Pacific Power & Light Co optimum benefit of water in the Lewis River. Installed since 1957, the computer calculates power generation and peak capabilities to a refinement not previously practicable.

The 205 computer performed the mass of calculations involved in developing sequential plant loading steps in their relationship to available water supply and different power rates. The steps allow greater refinement of plant operation. Furthermore, by eliminating human errors and variations in the reading of curves, the calculator affords optimum arithmetical accuracy.

Rated capacities at Lewis River plants are: 136 Mw at Merwin; 108 at Yale; 204 at Swift No. 1; and, 70 at Swift No. 2 for a total of 518 Mw. With reservoirs full, maximum capability is 611 Mw. The proposed Muddy project will add 110 Mw rated and 126 Mw maximum.

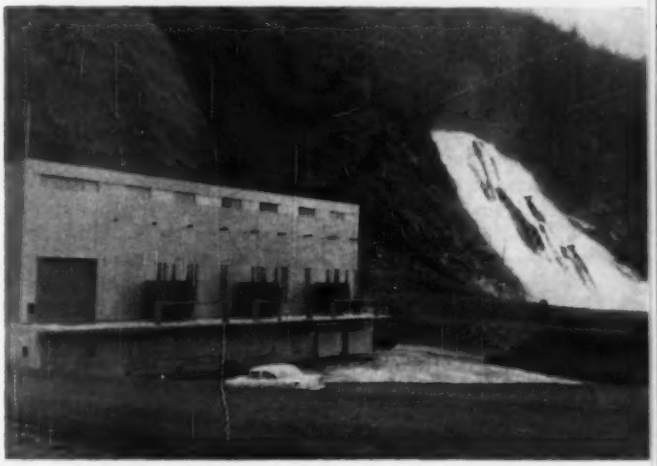
Completion of Swift at the end of 1958 increased usable storage to about 900,000 acre-ft, which substantially controls the natural flow. Muddy's 277,000 acre-ft storage upstream will bring total storage to 1,177,000 acre-ft, which will control the Lewis River except under extreme conditions. Natural flows recorded at Merwin plant vary from 700 to 129,000 cfs, this wide variation requiring careful planning of reservoir operation.

Calculation and summation of power generation at all five plants, involving the drafting and refilling of four reservoirs, are long and tedious for an engineer using tables,



BLOCK FLOW DIAGRAM is framework of related steps in calculations. Preparing it takes 60% of programing time

ELECTRONIC COMPUTER at Portland, Ore., made computations for designing the plants, and for its operations



SWIFT POWERHOUSE NO 1 uses a spill of 7,500 cfs in generating power up to its maximum capability of 250 Mw

Optimizes Use of Lewis River

curves, and hand calculator. He would need two days to figure one year of operation by months. Past practice has been to use only one approximate average conversion factor for each plant per month. No attempt was made to vary this factor with plant load because of the volume of calculations.

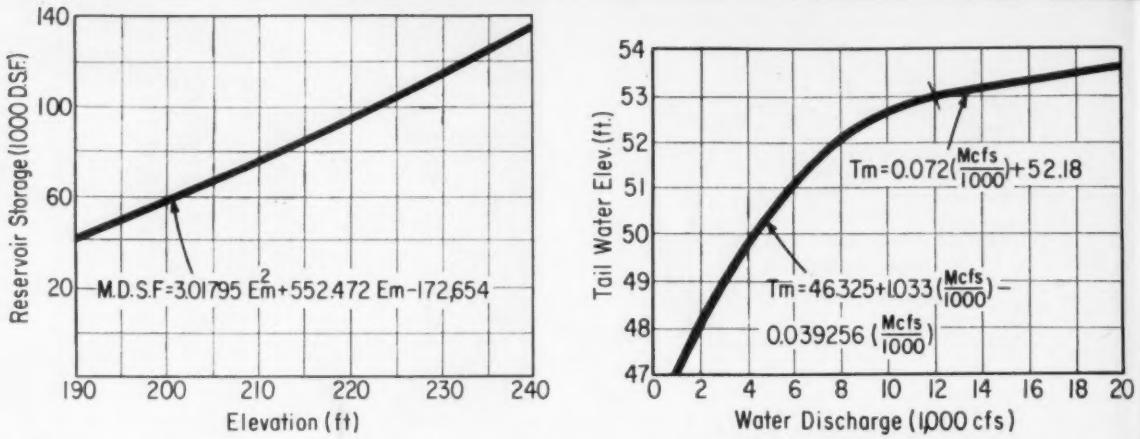
In one computer program, a loading procedure was developed in 13 steps for one plant. Factors were designed to compensate for difference in price of power during heavy-load hours, compared to nights and Sundays. Loading steps were related to water used to give greatest dollar value of energy rather than the most energy in Mwhr. The computer selected the appropriate kwhr/cfs factor, corresponding to plant load step and water use.

For long-range power studies and evaluation of new plants over historical water years, a simplified plant loading procedure in seven load steps is used, adjusting generation to average monthly system load factor. The computer selects the conversion factor according to a turbine efficiency curve.

Both programs operate from given stream flows and monthly reservoir elevation rule curve.

A new computer program has been written for calculating power from the Lewis River plants. Besides the natural stream flow and a typical reservoir rule curve for each plant, the computer is given total required monthly generation in average Mw. It calculates generation by plants and goes through three to seven iterations per month until the correct month total is reached. The computer also determines the water used and month-end reservoir elevation. This program determines plant load-carrying capability and system firm capability related to system load shape. The Lewis River plants take load variations after steam, run-of-river hydro, and purchased power in prime power determinations.

Merwin, last plant down river, has a minimum fish-water requirement that complicated manual calculation for low stream flows. Thus the conversion factors were usually



MERWIN PLANT CURVES show formulas used for reservoir storage, kw/cfs factor, plant peak, tail-water calculations

estimated roughly. With the computer, however, kwhr/cfs and generation are accurately worked out.

For any quantity of water less than that required by one Merwin unit at best gate, the computer determines the percentage of time at best gate and at minimum fish water, computes power for each load, and combines the power values for the month total.

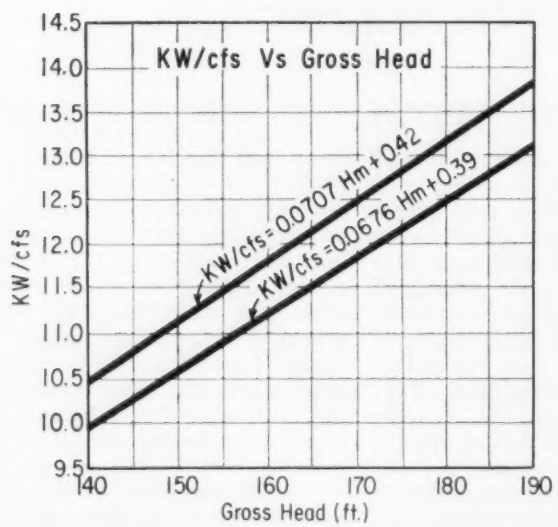
In the computer calculation, heads are figured to 0.1 ft, instead of being rounded out to the nearest 1 ft as in manual method. As Merwin overlaps Yale 9 ft, and Yale overlaps Swift No. 2 by 20 ft, the computer program selects a point on the backwater curve based on evaluation of the overlapping reservoir in determining tailwater for these plants.

Setting up a computer program has several steps. First, a block flow diagram is drawn to provide a sequential framework of related steps, including logical decisions at certain critical points. These decisions the computer must follow for each monthly calculation. The complete flow chart has all the formulas to be used in calculations, including those for reservoir storage, kwhr/cfs factors, plant peak capacity, and tail-water curves. Limitations, such as generator maximum and minimum output, upper and lower limits of storage, are included. Preparation of a flow diagram with formulas takes about 60% of the programing time.

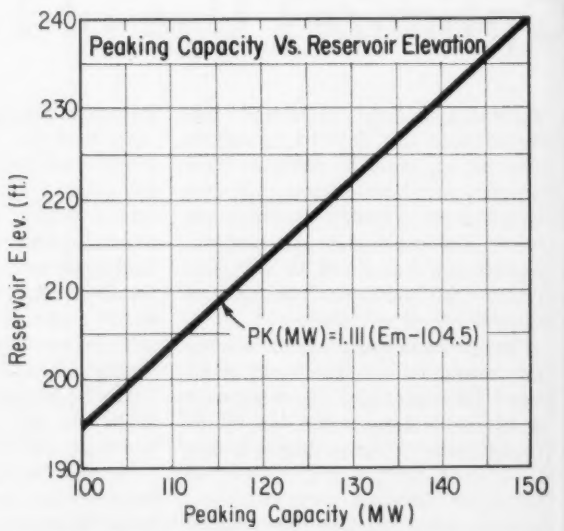
The flow diagram is next converted to computer language by writing, in proper sequence, commands for arithmetic, storing data, and printing format. The program is then punched on cards or paper tape to be fed into the computer.

Before starting operation, some 33 years of taped stream flow records for each plant and reservoir rule curves are stored in the computer memory.

Longer than 600 years of power generation have been calculated for the Lewis River plants. The five-plant program has 2,160 steps per month, although the estimated average steps the computer actually takes are 1,600 per month.



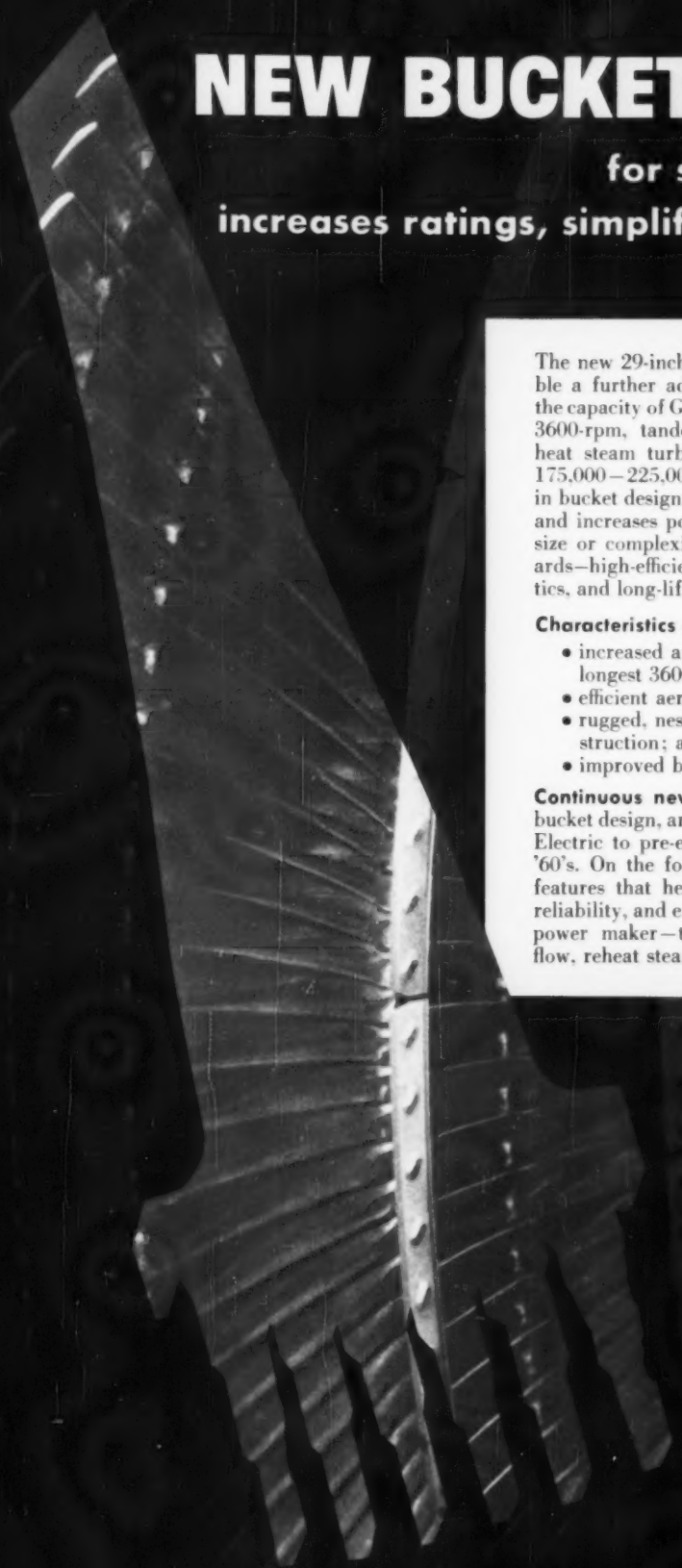
MERWIN CURVES relate kw/cfs factor to dam's gross head, an important relation in PP&L generation calculations



PEAKING CAPACITY at Merwin Powerhouse is shown in its relationship with reservoir elevations at this river site

NEW BUCKET DESIGN

for steam turbines . . .
increases ratings, simplifies arrangements



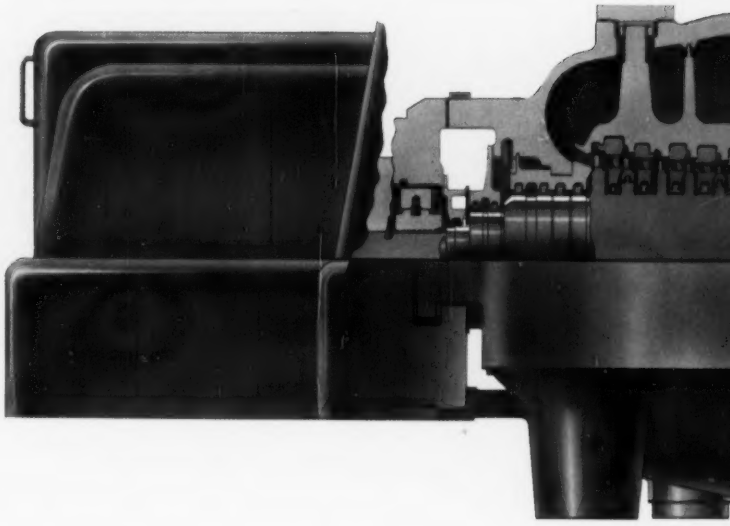
The new 29-inch, last-stage bucket makes possible a further advancement in turbine design—the capacity of General Electric's well-established 3600-rpm, tandem-compound, double-flow, reheat steam turbine can now be raised to the 175,000—225,000-kw range. This new concept in bucket design helps improve turbine heat rate and increases power without increasing turbine size or complexity. Inherent G-E bucket standards—high-efficiency, low-vibration characteristics, and long-life qualities—are maintained.

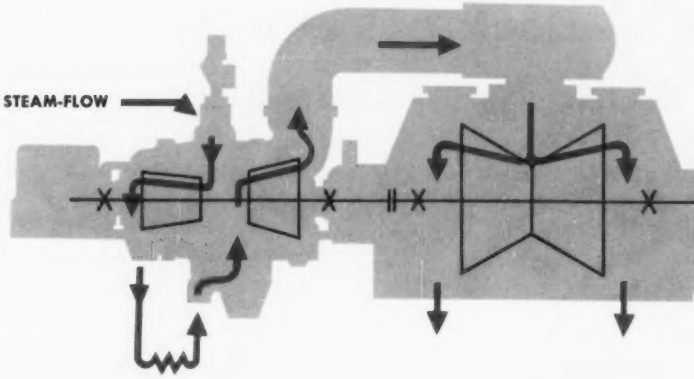
Characteristics of the advance are:

- increased annulus area over the previously longest 3600-rpm last-stage bucket;
- efficient aerodynamic profile;
- rugged, nested pin-and-finger dovetail construction; and
- improved bucket material.

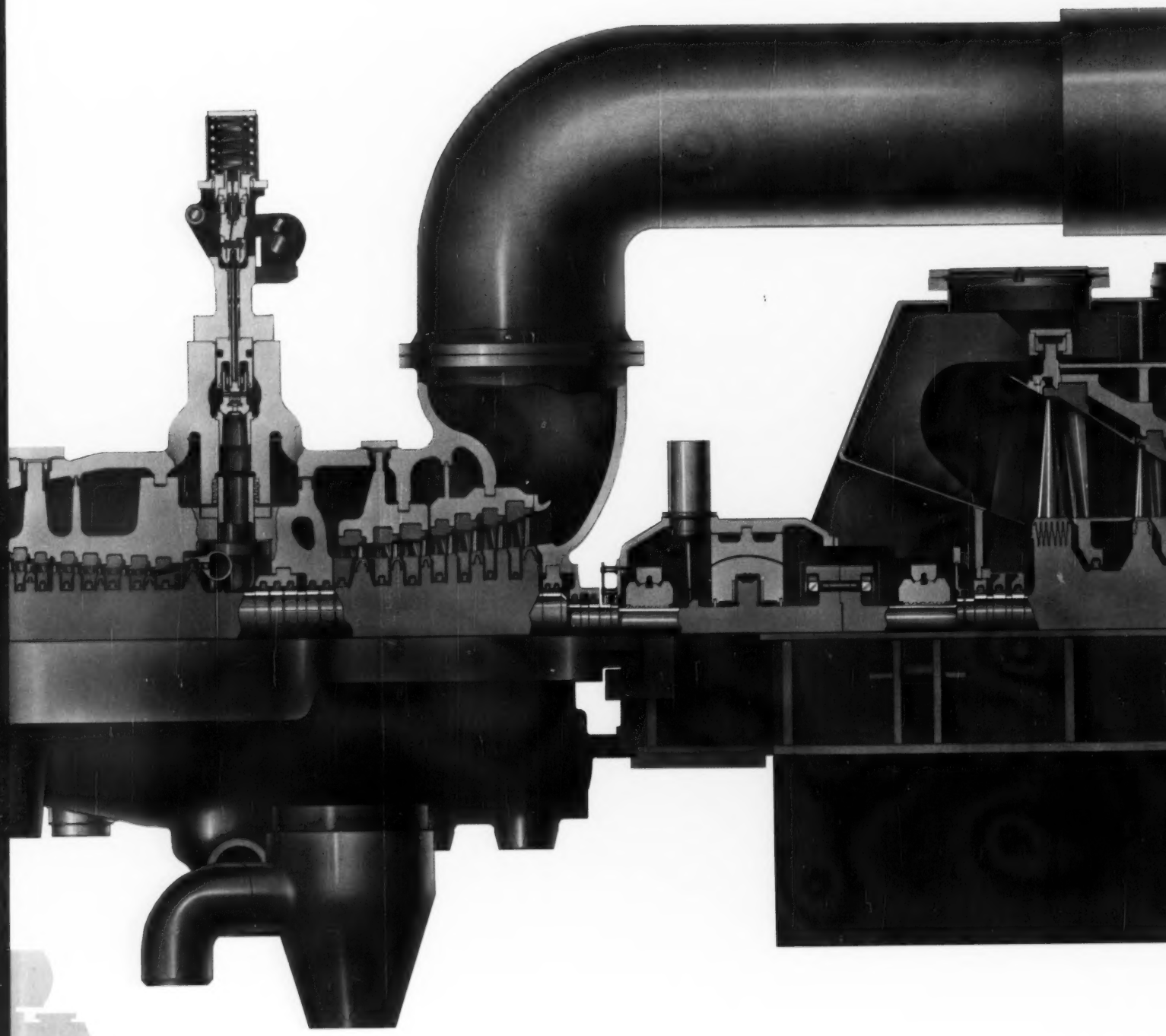
Continuous new developments, such as this bucket design, are making it possible for General Electric to pre-engineer steam turbines for the '60's. On the following pages are more design features that help improve heat rate, increase reliability, and extend ratings of the time-proven power maker—the tandem-compound, double-flow, reheat steam turbine.

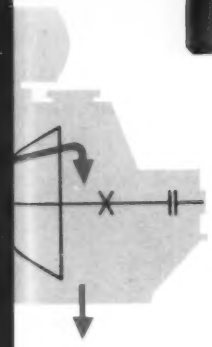
GENERAL ELECTRIC

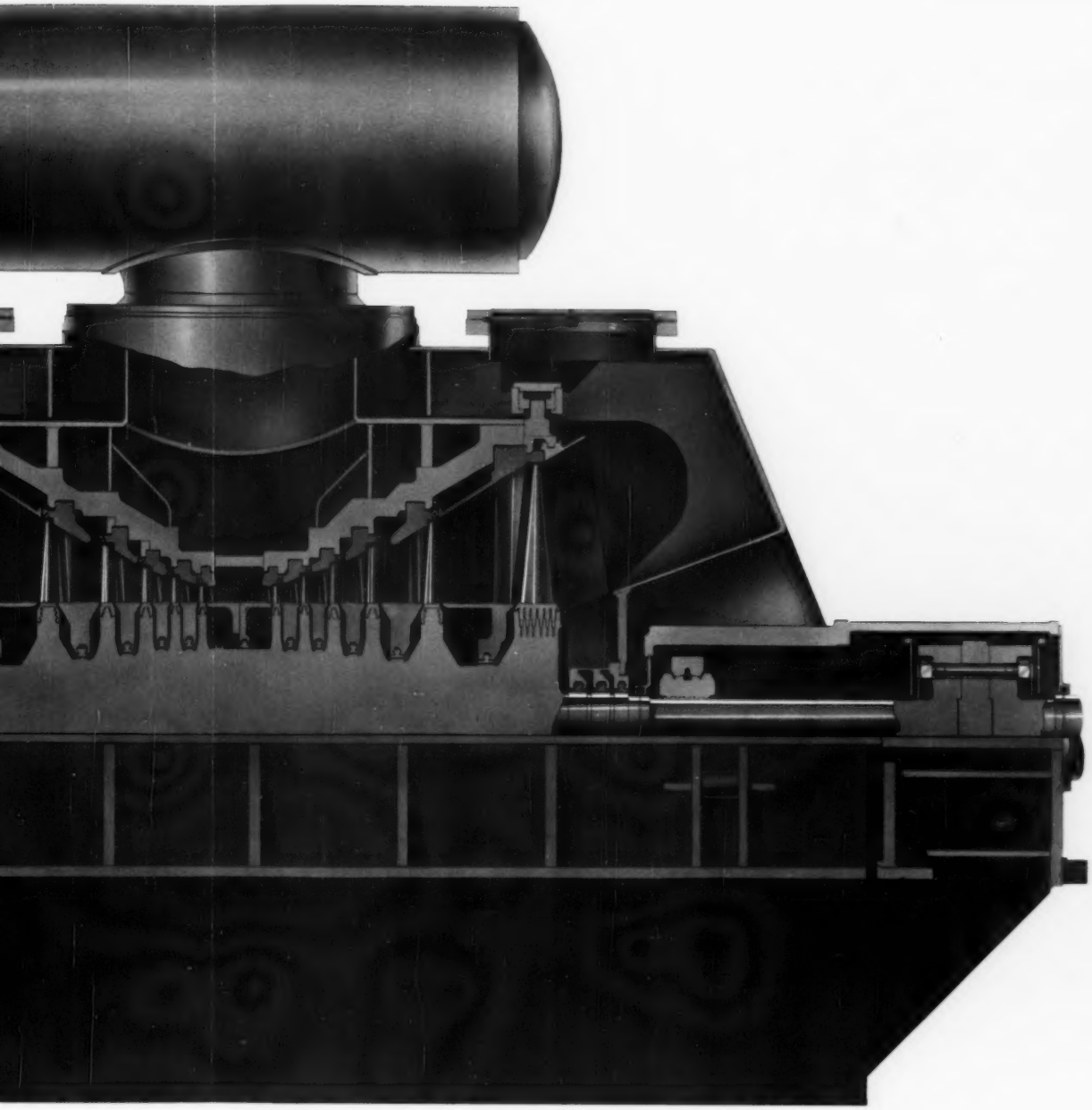



STEAM-FLOW

X
II

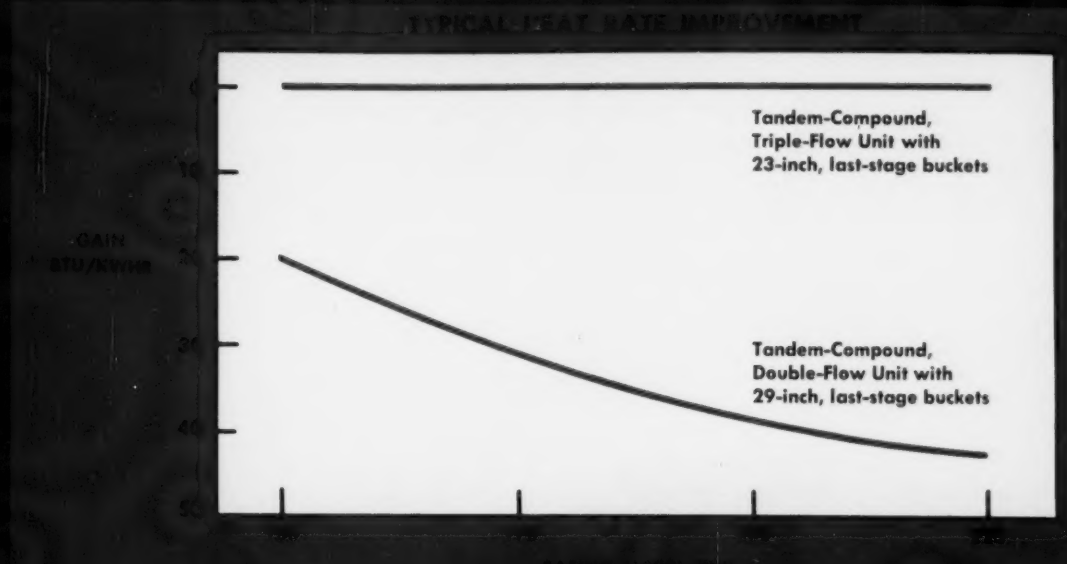


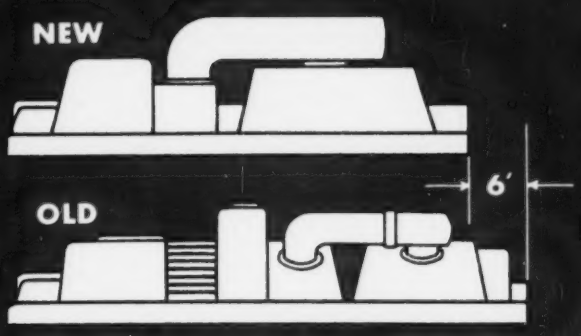




3600-rpm, tandem-compound,
double-flow, reheat steam turbine

GENERAL ELECTRIC





MORE POWER,
LESS SPACE,
IMPROVED ECONOMY

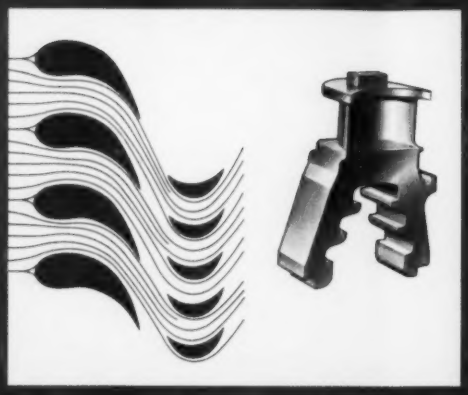
Simplified Design Helps Improve Turbine Economy for the '60's

Inherent simplicity and ruggedness of construction have helped establish the basic double-flow design as a standard concept. Now General Electric's newly designed 3600-rpm, tandem-compound, double-flow, reheat steam turbine, with 29-inch, last-stage buckets – in addition to being more compact with improved heat rate – is adding emphasis to:

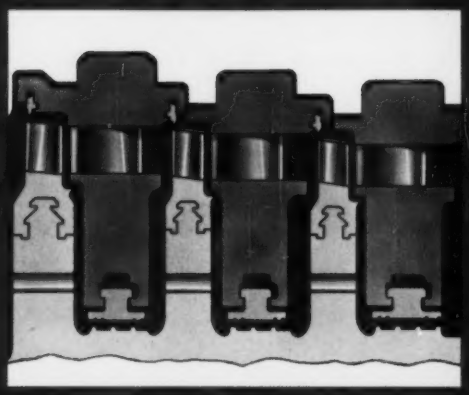
- **Smoother operation**—two bearings per rotor span allowing independent balancing, vibration isolation between spans, and shorter front standard;
- **Reliability**—intercept valves close to reheat inlets for controlled overspeed, thrust bearing in middle bearing housing for better balance of bucket-to-nozzle clearances;
- **Accessibility**—one-piece lower and upper half-shell construction, single crossover;
- **Ease of assembly and disassembly**—one less turbine rotor, one less cast steel shell, fewer bearings, packings, and couplings.

This is another of General Electric's pre-engineered turbines for the '60's – turbines which can help you meet ever-increasing power demands. For more information on any of General Electric's large steam turbine-generators, contact your nearest General Electric Apparatus Sales Office. 254-79

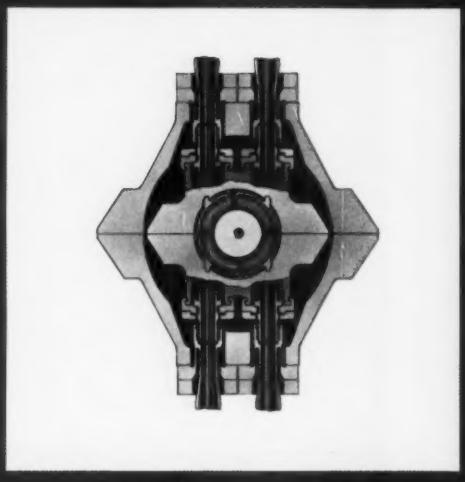
GENERAL ELECTRIC



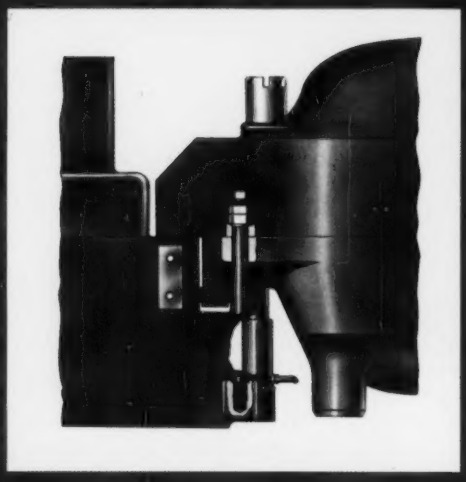
IMPULSE-TYPE STEAM PATH,
RUGGED BUCKET DESIGNS



REMOVABLE RADIAL SPILL STRIPS,
SPRING-BACKED SHAFT PACKING



NOZZLE BOX CONSTRUCTION



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These Important Evaluation Features of General Electric Pre-engineered Steam Turbines Mean...

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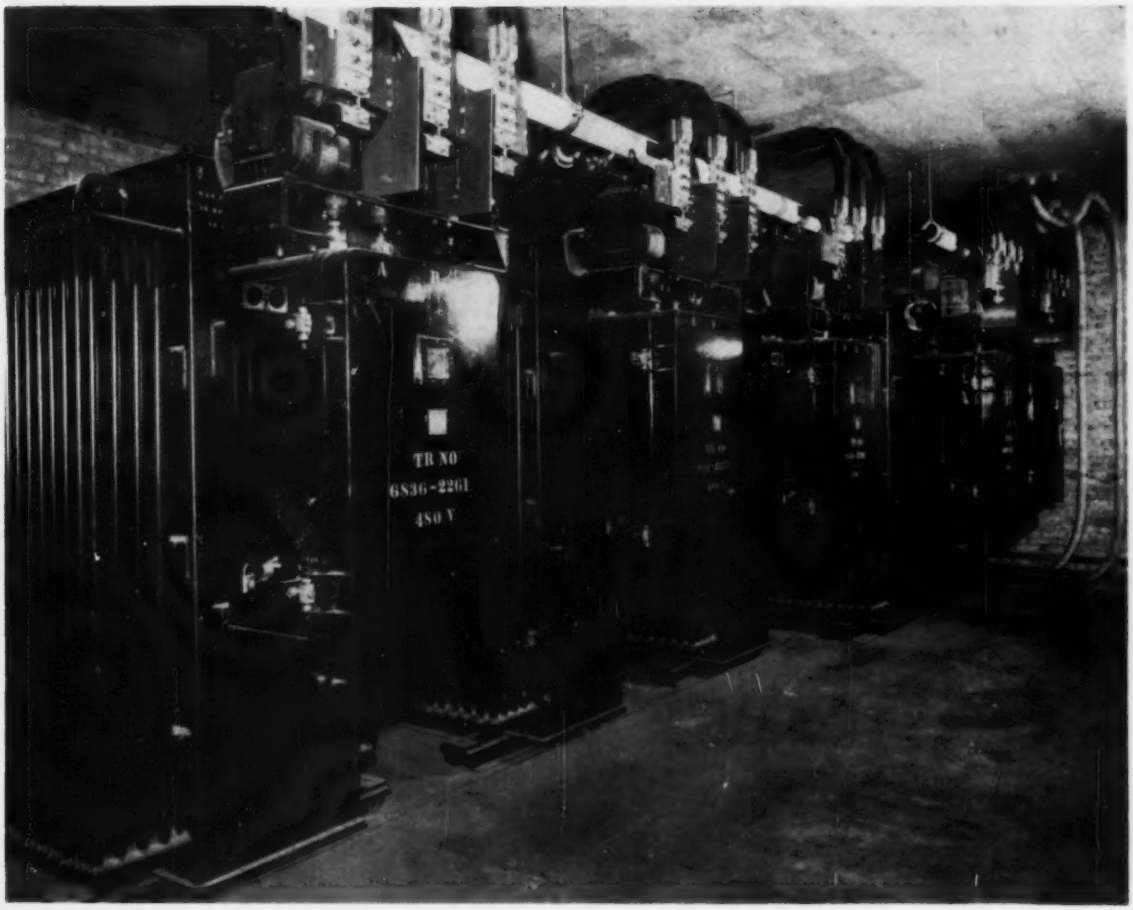
- Simplified Operation
- Greater Reliability
- Increased Availability
- Accelerated Installation
- Reduced Maintenance
- Extended Life

Progress Is Our Most Important Product

GENERAL ELECTRIC



FIVE TRANSFORMERS characterize Commonwealth Edison's largest 480-v network vaults in Chicago's downtown business area. Such network transformer installations cost less than the equivalent 208-v jobs in serving large customers

480-V Spot Networks Economic

More than 200 Mva in Chicago's 208-v network area offer Commonwealth Edison, large customers worthwhile savings

NOBLE G. LARSON, Distribution Planning Engineer, Commonwealth Edison Co, Chicago, Ill.

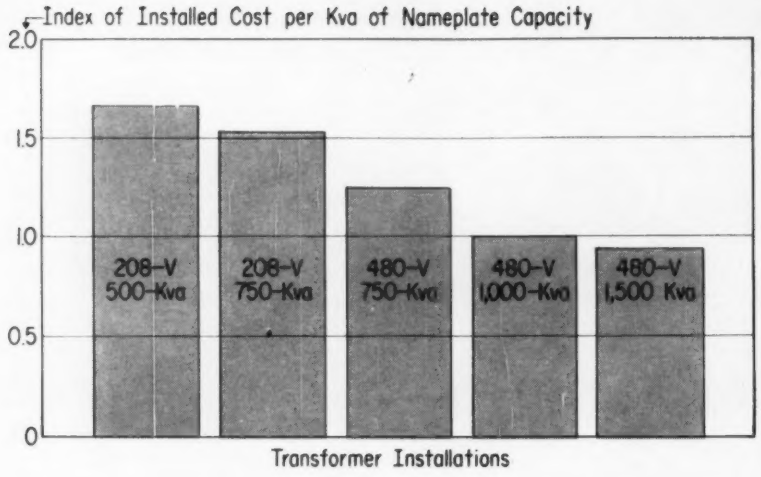
More than 200 Mva of capacity in 480-v spot networks has been installed by Commonwealth Edison Co to serve large customers inside and outside the 208-v network area. Economics were the determining factor in these installations, which have resulted in savings for both customers and company. The extent to which this economic factor has been recognized is indicated in the last four years by the rate of increase of 480-v capacity which has been several times larger than that of 208-v capacity. The 480-v spot network program started in 1937, when the 208-v network in Chicago's downtown business district was just six years old.

The 208-volt network covers 3 sq miles. In this area there are 46 480-v spot network vaults and 165 transformers. The latter have a total nameplate capacity of 170 Mva, 20% of the combined 208 and 480-v transformer capacity in the network area.

The 480-v installations are the spot-network type. They are not tied together by secondary mains because they are relatively scattered and there is no necessity to serve small loads from such mains.

Outside the network area the 480-v spot networks serve large loads where submersible equipment is required. In general, they supply high-riser apartment buildings, shopping centers, and stores. There are 13 such installations, having 27 transformers with a total nameplate capacity of 27 Mva.

Primary supply is common to the 480 and 208-v networks. It consists of 12-kv underground cables supplying eight network sections. Three sections are supplied from the Fisk generating station, about four miles from the center of the network



INDEX COSTS are average of two, three, four, five-unit installations. Actual costs per kva per installation are within 6%, structure costs being excluded

area. The others are supplied from several 69/12-kv transmission substations in or close to the area. The network sections vary in size and have from six to 14 network feeders each.

Primary feeders and network transformers were originally planned to provide for second-contingency outages. This planning was modified in 1957 ("Network Changes Bring Savings," EW, July 28, 1958, p 62) to a design only for first-contingency outages during the four summer months of peak load and for second-contingency outages during other months. The change resulted in considerable economy. Approaching that of first-contingency design, it required only that planned outages be dispensed with during heavy-load periods.

The economics of wiring large buildings for 480/277-v vs 208/120-v distribution have been well established, savings being as high as 25%. Customers often request both 208 and 480-v plans for determining their own overall economics.

Some operators of multiple-occupancy buildings elect 277/480-v supply to reduce wiring costs. In cases where the occupants are to be metered and billed individually by the company and certain capacity requirements are met, such 277/480-v supply will be furnished, the company providing without charge the dry-type transformer capacity up to certain limits for reducing the 480-v supply to the utilization voltage.

Savings are also available to the utility when service can be provided at 480. In Chicago, the largest 208-v network transformers are 750 kva. The most common size of 480-volt network transformer is 1,000 kva. A comparison of the costs of these sizes would show a 25% saving in favor of the 480-v units.

Three sizes of 480-v transformers —750, 1,000 and 1,500 kva—are used on the Chicago system. The 750 and 1,000-kva units have 5% impedance; the 1,500-kva units 7% impedance. All are Askarel filled. Each has a built-in, 3-position disconnect and grounding switch on the primary side.

Transformers are delta-connected on the primary and wye-connected on the secondary side. Commonwealth Edison's present standard, which is also an industry standard, is 12,000-480/277-v with two 2½% taps above and two 2½% taps below the nominal voltage. All network protectors are the submersible type. Sizes used are 1,200, 1,600 and 2,000 amp for the three transformer sizes.

Most Vaults Inside

Burndy "Y"-type fuses are installed on top of the protectors, rather than inside, in order to increase the protectors' thermal capability and to provide a means of isolating them in case of inside trouble. A solid copper link is installed in the fuse position inside the protector.

Where there are only one service and one meter for a 480-v network vault, the vault is generally inside the building. The building owner constructs it at his expense in accordance with company specifications. In some installations serving buildings in which tenants are metered individually (Commonwealth Edison does not permit resale in new buildings), the vaults in subsidewalk space are provided by Commonwealth Edison.

There are no segregating walls between the transformers and the protectors in the vaults. The maximum number of transformers in a single vault is five, and all are connected to a common 480-v bus.

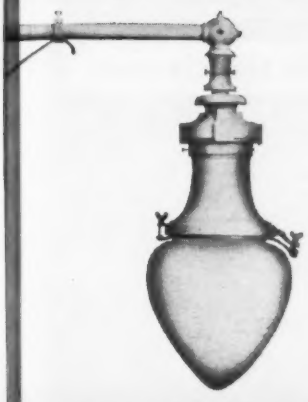
(*Continued on page* 112)

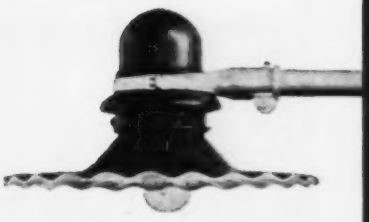
Vault Capabilities in Kva

Transformers Installed	Summer		Winter		
	Normal	First Contingency	Normal	First Contingency	Second Contingency
2–1,000 Kva	1,900	1,250	2,000	1,150	.....
3–1,000 Kva	2,850	2,500	3,000	2,300	1,500
4–1,000 Kva	3,800	3,750	4,000	3,450	3,000
5–1,000 Kva	4,750	5,000	5,000	4,600	4,500
2–1,500 Kva	2,850	1,875	3,000	1,725	.....
3–1,500 Kva	4,275	3,750	4,500	3,450	2,250
4–1,500 Kva	5,700	5,625	6,000	5,175	4,500
5–1,500 Kva	7,125	7,500	7,500	6,900	6,750

Notes: Summer capabilities are based on restricting planned outages during heavy-load periods of all network feeders from June 1 to September 30.
Capabilities are based upon transformers and associated vault equipment only. There are no secondary interconnections at 480 v between vaults.

If your lighting equipment looks like this . . .





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then . . .

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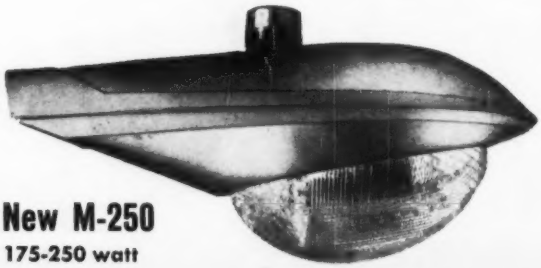
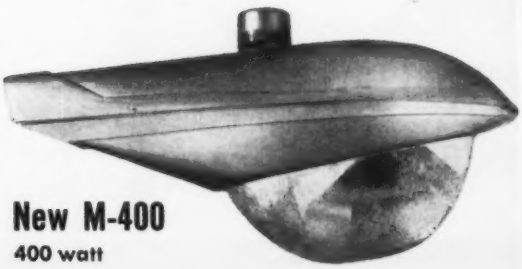
New beauty, safety, efficiency



New M-250
175-250 watt



New M-400
400 watt

For RESIDENTIAL STREETS . . .

. . . LIGHT TRAFFIC STREETS . . .

. . . ENTRANCE AND EXIT RAMPS

For HEAVY TRAFFIC STREETS . . .

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. . . BUSINESS STREETS

for every street and highway

New M-1000
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Combining the world's newest, smartest styling with outstanding performance and economy, General Electric's new mercury luminaires present the same basic design in every unit. And, there's a unit for every roadway lighting application.

From 175-watt applications on light-traffic streets to 400-watt applications on business and traffic streets and highways to 1000-watt applications on whiteways, these luminaires provide long, highly efficient service. 100% designed by General Electric—with components engineered to work together—these new luminaires feature:

Power Pack design with built-in ballast in all units; all wattages, including 700 and 1000 watts.

Terminal board is pre-wired, requires only two connections, eliminates splicing, reduces installation time.

Four-position socket allows selection of IES light distributions with a simple screw setting.

Universal slipfitter accommodates either 1¼- or 2-inch bracket with a quick adjustment—no additional parts.

Sealed optical assembly with silicone rubber gaskets—blocks entry of bugs and dust.

New photoelectric control has long-life G-E cadmium sulphide cell for guaranteed dependability.

Acrylic refractor on M-250 unit, a G-E exclusive, and heat-resistant glassware on larger units reduces breakage.

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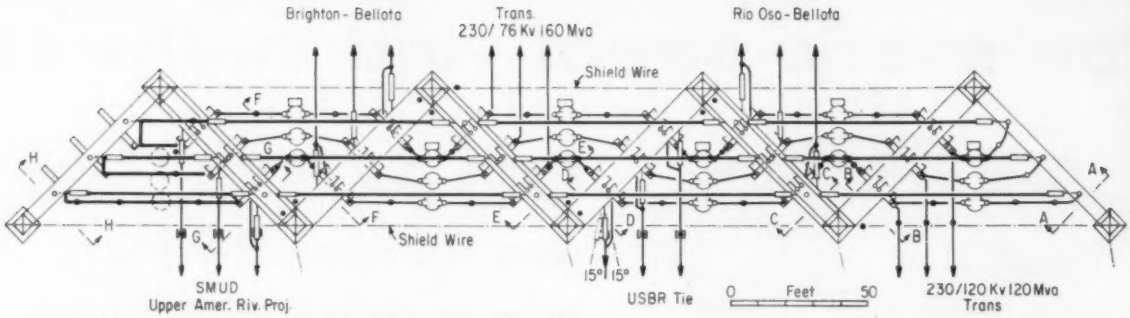


ZIG-ZAG HIGH-VOLTAGE STRUCTURE at Hedge Substation, besides saving on material and installation, affords more access for maintenance. Columns and trusses are assembled on the ground and lifted to position by a crane

Zig-zag Structure Yields Savings

Six-position 230-kv steel design cuts material, installation costs at SMUD substation soon to be energized

R. N. CONNELLY, Sacramento Municipal Utility District, Sacramento, Calif.

A zig-zag high-voltage structure saves money and provides greater access and adaptability to the ring-bus sections of Hedge Substation which will be activated this fall by Sacramento Municipal Utility District.

About $6,000 in material and $4,800 in installation costs were saved in the six-position 230-kv zig-zag steel structure which weighs only 166,000 lbs. This weight compares with 190,000 lbs for a conventional vertical-plane configuration. Installation costs were reduced further by assembling columns and trusses on the ground and lifting them into position with a mobile crane. Line and transformer disconnect switches were installed on the underside of the trusses, rough adjustments were made, and the complete assembly was lifted into place.

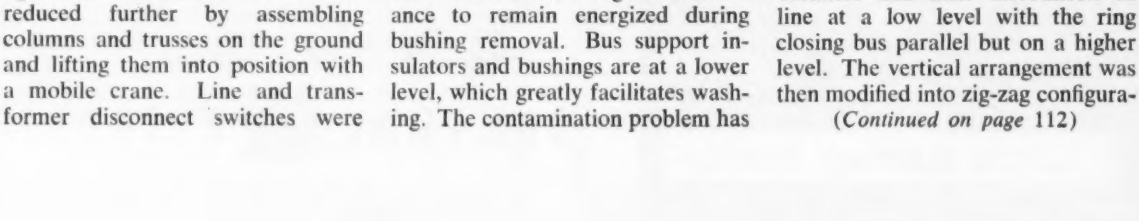
Reduction in the number of footings is apparent, nine columns with four footings each compared to 16 columns with four each for a conventional structure. Each column required only two deep and two shallow footings, as the alignment of the zig-zag structure with respect to line pulls subjected only two footings to uplift.

Access to oil circuit breakers and disconnects for maintenance or replacement is ample. Higher level buses have sufficient ground clearance to remain energized during bushing removal. Bus support insulators and bushings are at a lower level, which greatly facilitates washing. The contamination problem has been reduced by elimination of nearly all non-strain insulators except those for disconnect switches.

The equipment arrangement was influenced more by physical than electrical requirements. As transmission lines radiate from the station to the east or west, it was most advantageous to have the line take-off structures in a north-south orientation which happened to be the narrowest dimension of the ground plot. The presence of energized 115-kv lines and switching structures limited the area that could accommodate equipment.

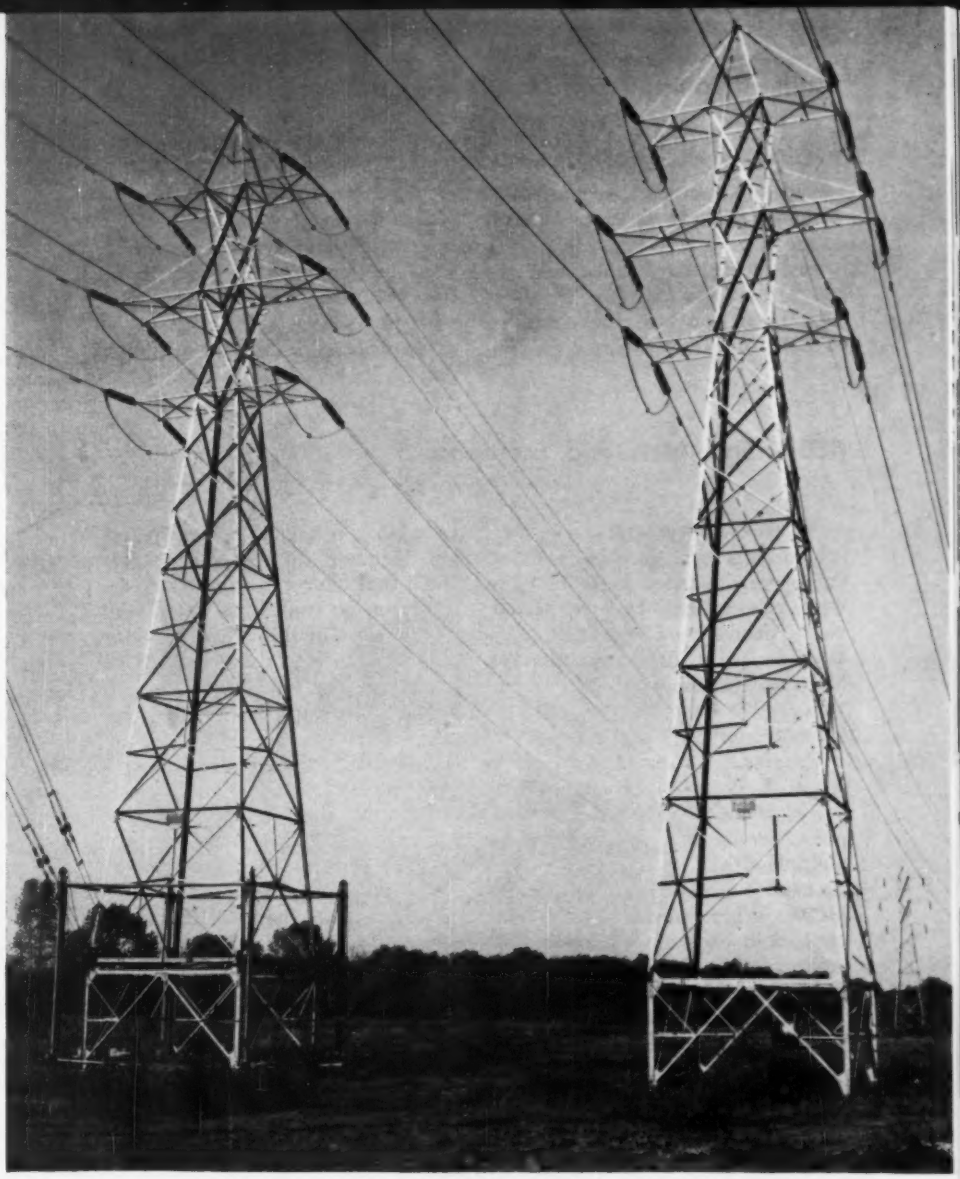
These restrictions, and the need to take lines and loads off normally to the structure, led to specification of a vertical configuration. Such configuration places the oil circuit breakers and their disconnects in line at a low level with the ring closing bus parallel but on a higher level. The vertical arrangement was then modified into zig-zag configura-

(*Continued on page* 112)



NINE COLUMNS in this design each required four footings, with four footings also. In the novel design, two footings in contrast with usual structure's use of 16 columns, each per structure are subject to uplift

Typical of today's transmission problems, reconductoring was accomplished by Cleveland Electric Illuminating Company by raising many 33-year-old Blaw-Knox towers. When present program is complete, the company will have raised and reconductored 93 miles of double circuit lines.



How Blaw-Knox Tower specialists can help you meet today's transmission problems

Because of growing electrical demands, many power companies are faced with the problem of modifying existing lines and designing new lines for the higher voltages of tomorrow.

Blaw-Knox tower engineers, with more than forty years' close cooperation with power companies in the solution of many different transmission problems, can bring practical assistance to bear on your particular problem.

If your project is one of modifying a present line for greater capacity within a limited right-of-way, or reconductoring, or if you are developing an extra high voltage grid, and need specific answers to tower design and anchoring problems, Blaw-Knox will be glad to help. Contact the Tower Sales Department, or you may wish to write for a copy of Bulletin 2570, outlining these engineering services. No obligation, of course.

Transmission Towers—Steel transmission towers custom built for each installation . . . multi-circuit and other special structures . . . guyed and self-supporting antenna towers for AM, FM, TV and Microwave, Antennas . . . rotating . . . Radar Radio Telescopes . . . Tropospheric Scatter and Ionospheric Scatter.

BLAW-KNOX

BLAW-KNOX COMPANY
Blaw-Knox Equipment Division
Pittsburgh 38, Pennsylvania

Plant Revamped for Standby Operation

(*Continued from page* 95)

heights. After pulling was completed, sufficient slack was provided manually to make the cable conform to the contour of the rack.

Six cables were pulled into the lower rack and clamped in place. The upper rack was then installed and the other six cables pulled in. The crew, having gained experience on the first six cables, pulled in the second six in about 4 hr.

A solid metal cover over the outdoor portion of each rack shields the cables from the sun. The cable rack was placed so that a second cable rack can be installed next to it.

480-V Spot Networks Economic

(*Continued from page* 106)

Transformer neutrals are connected together and in building vaults are connected to the building water-pipe system. In sub-sidewalk vaults neutrals are connected to a 10 ft by ⅝ in. driven ground rod. Neutrals are also connected to the 12-kv cable lead sheaths, which are bonded together in all manholes.

Customer services are generally taken off by bus extensions through the vault walls. At a customer's request, service may be provided by multiple sets of one-conductor service cables, in sizes from 500 to 800 MCM. Where service cables are used, both ends are equipped with limiters.

The limiters are generally of the "high-capacity" type, having an interrupting capacity of 10,000 amp symmetrical. But company tests show that ordinary 208-v limiters are adequate for 480-v use, provided that the total transformer capacity in the vault does not exceed 2,000 kva. On this basis the ordinary limiters have been used for several of the smaller installations as the high-capacity limiters are more expensive.

Balancing transformers have been installed in three, four or five-unit vaults, but are not necessary in two-unit vaults as the normal load on the transformer is not critical.

Capabilities of various sizes of network vaults have been determined by temperature measurements and thermal studies based on an approximate 40-year life of equipment. In many cases specific capabilities have been determined for individual vaults.

Zig-zag Structure Yields Savings

(*Continued from page* 110)

tion to realize some further savings.

The 230-kv section purchased initially provided four line and two load positions, with expansion planned to an ultimate of eight line and three load positions. Plans for the 115-kv section call for expansion from six to eight positions. The zig-zag design lends itself to growth in either direction with negligible effort and interruption time.

Fault protection of the ring bus is included in the protection for the line or load served by each section of the ring. Back-up protection is provided by single-zone impedance relays and timing equipment to trip the adjacent circuit breaker if there is a mis-operation of the primary breaker. Carrier current coupling capacitor devices provide potential for line relaying, as well as coupling for line distance carrier relays on 230-kv lines. Transformers give main power transformer relaying potentials.

Hedge Substation will be a completely automatic station remotely supervised via microwave from operating headquarters eight miles away. Transmission lines from SMUD's Upper American River Projects will terminate at the substation which will accommodate up to 300 Mw of power purchased from Pacific Gas & Electric Co under contract.

Direct Thermal R&D Makes Navy Optimistic

Direct thermal generation of electricity is simple, reliable, quiet and takes little space—all qualities for which the Navy is willing to pay a research and development premium, said Cmdr Bryce D. Inman, USN Bureau of Ships.

He told the Armed Forces Chemical Assn in Washington, D. C., that thermo-electricity (produced by the direct interaction between heat flow and various materials) still faces a "staggering number of problems" before a "good" material can be found to use in a generator. He added, however, "We (the Navy) are very optimistic."

Two 500-w thermo-electric generator models will be delivered to the Bureau of Ships in 1960 by contractors, as well as two 5-kw oil-fired thermal generators. These models, said Inman, should be "almost as efficient as a small gasoline engine generator. They are not aimed directly at a military requirement. Rather they are a step toward a full size shipboard generator which will have a capacity of at least several hundred kilowatts. An interesting feature of one of these generators is that its output is 440 v, 3-phase, 60 cycles . . ."

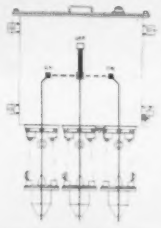
Co-op Group Negotiates For Anniversary PR

The National Rural Electric Cooperative Assn is dickering with Mauer, Schuebel & Fleisher, a Washington, D. C. public relations firm specializing in labor unions, to handle part of NRECA's promotion of the REA silver jubilee in 1960. NRECA would retain the agency for a six-month period ending in May, the anniversary month, when additional money may be available to continue the program. NRECA also is negotiating with another small Washington, D. C., firm to write special artciles on jubilee for publication in national magazines. Both groups would be hired in addition to a Chicago firm—Aubrey, Finley, Marley & Hodgson—which will handle jubilee advertising.

examples of G&W

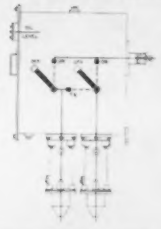
distribution system flexibility

PROBLEM:
To supply one load circuit from either of two feeders.



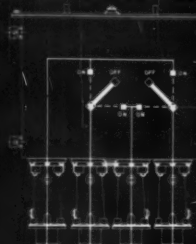
TYPE RAD-M SWITCH
THE G&W PRE-ENGINEERED SOLUTION

PROBLEM:
To connect transformer to either or both feeders looped through.



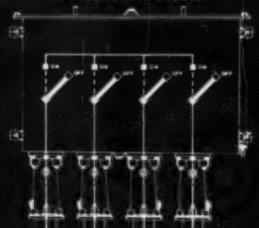
TYPE RAL-TB SWITCH
THE G&W PRE-ENGINEERED SOLUTION

PROBLEM:
To connect two loads to either of two feeders.



TYPE RAJ SWITCH
THE G&W PRE-ENGINEERED SOLUTION

PROBLEM:
To connect one load to any of three feeders—or one feeder to three loads.



TYPE RAM SWITCH
THE G&W PRE-ENGINEERED SOLUTION

PRE-ENGINEERED FOR MINIMUM COST

Pick a distribution system problem—and you'll find a basic G&W Load Break Oil Switch that's *pre-engineered* to solve it. G&W switches are made of standardized parts designed so they can be combined in a vast number of forms to handle specific by-passing, disconnecting, or fusing requirements. They allow you to meet the needs of individual load centers without the expense of individual engineering. Here is something new in distribution system flexibility—at lower cost that helps you keep construction and installation expenses down. Don't overlook the opportunities G&W pre-engineered load break oil switches offer for simple solutions to sectionalization problems at significant savings. Switches and combination units are available rated from 600 to 34,500 volts, 400 to 1000 amperes continuous capacity, 400 amperes load-break. Special switches to 69,000 volts can be furnished.

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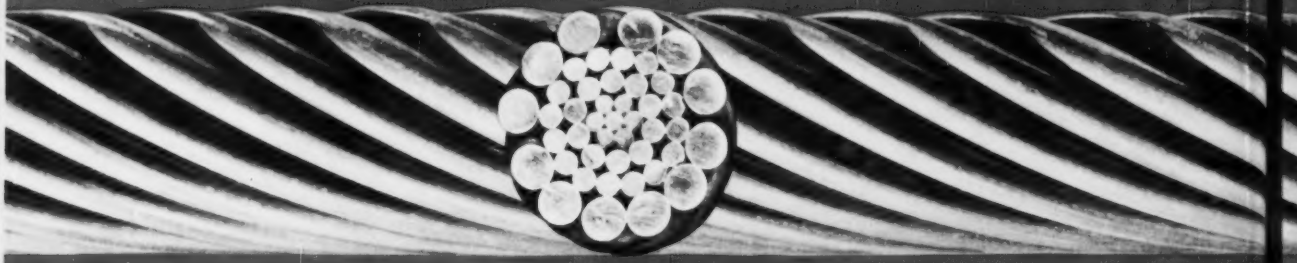

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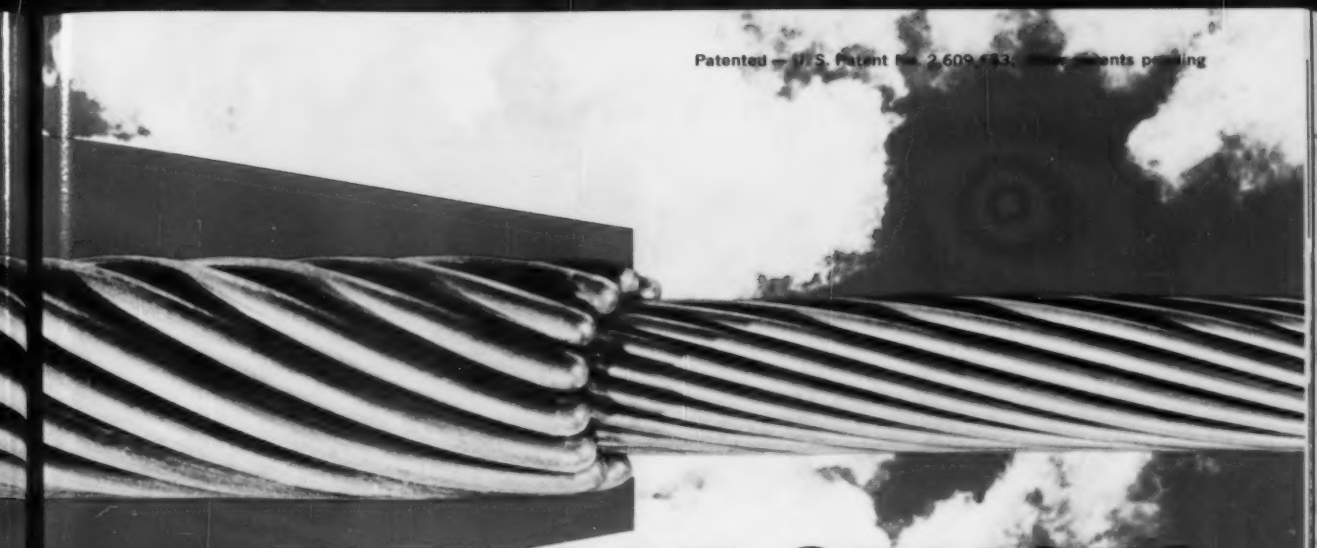

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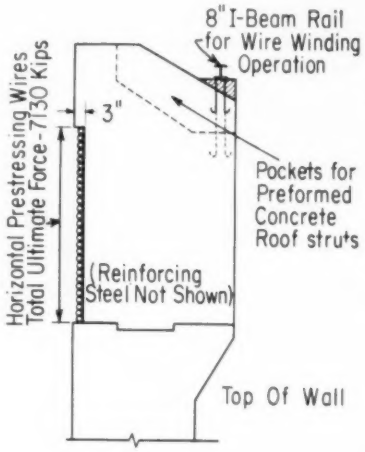
Wire Prestresses Reactor Shield

The upper section of the cylindrical concrete radiation shield around the spherical containment vessel of Consolidated Edison's new reactor at Indian Point, N. Y., will be wrapped with some 275 miles of prestressing wire to enable it to withstand horizontal forces exerted by the roof.

The roof, in the form of a dome, will be entirely supported by the cylindrical wall. The wall's top is beveled inwardly and has 24 pockets into which will fit preformed concrete roof struts. The prestressing operation will be performed by Preload Concrete Structures Inc., Westbury, N. Y.

The shielding wall, extending about 90 ft above grade, measures 181 ft OD, and 70 of the wall's 90 ft are 5 ft, 6-in. thick. The last 20 ft or so widen inwardly to 7 ft, 9 in. This widened section will be prestressed, and a 3-in.-deep chase has been cast in the outer surface to receive the prestressing wire. The chase is 4 ft, 3 in. from the top of the wall and extends 15 ft, 6 in. down the side of the cylinder.

The wire will be wrapped around the cylinder by means of a self-propelled machine suspended from a carriage that will travel around the top of the wall near the outer edge. The wire, in seven layers, will take six or seven weeks to apply, roughly one layer a week. In all, there will be some 2,530 wraps of wire, 163 wraps per ft. A pneumatic mortar


8" I-Beam Rail for Wire Winding Operation
3"
Horizontal Prestressing Wires Total Ultimate Force-7130 Kips
Pockets for Preformed Concrete Roof struts
(Reinforcing Steel Not Shown)
Top Of Wall

weather-protection coating will be applied over each layer. It is planned to wrap four days of each week and apply the coating on the fifth.

Initial wire size is 0.192 in. dia, which will be drawn to 0.174 in. as it is applied. This will impart a working stress of 110,000 psi in the wire and will result in a total ultimate inward force on the structure of 7,120,000 lb. This force not only will counteract horizontal forces exerted by the roof, but will withstand forces resulting from differences between inside and outside wall temperatures.

In prestressing a structure of this type, the carriage supporting the wire-winding machine normally is secured to cables terminating on the ground at the cylinder's center. In this case, however, work on the containment vessel will be in progress during the winding, so that a special method of anchoring the carriage has been devised.

A continuous 8-in. I-beam has been fastened to the top of the cylinder wall along the inner edge. The carriage will be secured to a trolley which will travel along the I-beam as the self-propelled wrapping machine progresses. To install the I-beam, anchor rods were cast in the wall and, since the beam is installed along a beveled surface, tapered blocks were fastened to these rods to provide a horizontal surface on which to secure the beam.

Computers Help Find Ruptured Fuel Slugs

The 80 eMw nuclear power plant being constructed near Chinon, France, by Electricite de France, will use two RW-300 Digital Control Computers for the detection and location of ruptured fuel cartridges.

The RW-300 system will monitor radioactivity of carbon dioxide cooling gas flowing through 1,148 channels in the reactor. A pinhole, split or other fault in one of the uranium fuel slugs will cause a gradual increase in radioactivity of the gas and must be detected before radiation reaches an unsafe level.

Computers will continuously scan electronic binary counters connected directly to radiation detecting devices in the cooling channels. The counters will accumulate and present to the computers two sets of measurements: a background gas activity count and a relative gas activity count. From these data and from measurement of the general activity in the reactor, the computers will calculate the change in radioactivity of the cooling gas in each group of channels. That value will be logged and checked against an upper limit. When the value exceeds the limit, a warning signal will be activated. If the condition continues beyond a safe level, an alarm will be activated.

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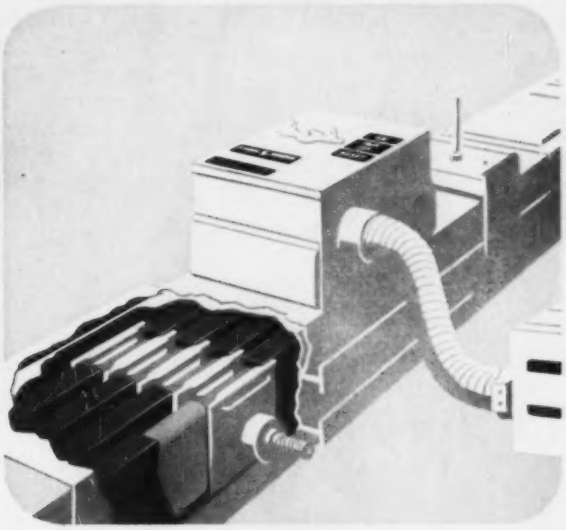
FOR INSULATION AND JACKETING

RESISTANCE TO MOISTURE – The mechanical water absorption of Butyl insulation in 90°C. water is only about *one-sixth* that of oil base compounds. This is an important characteristic for insulations to be used in direct burial, underground conduits, etc.



RESISTANCE TO HEAT – Because of superior resistance to deterioration caused by heat and traveling arcs, Butyl helps make possible the first low voltage busway system (600 v and below) designed specifically for aluminum conductors.

RESISTANCE TO WEATHERING – Butyl's inherently higher resistance to sunlight, moisture and weathering makes it the ideal material for this indoor-outdoor transformer casing. Integral molding of external parts provides reliable weatherproof insulation.

RESISTANCE TO AGING – Butyl is virtually ageless. That's why it was selected to stand up to sunlight and ozone in outdoor watt-hour meters. Butyl provides dependable insulation and must resist all weather conditions for 30 years.

Enjay Butyl is the best of the vulcanizable rubbers, either natural or synthetic, from the standpoint of electrical and dielectric properties, ozone and corona resistance, heat and moisture resistance, and long aging. Find out how versatile, low cost Butyl can help improve your products. For more information call or write your nearest Enjay office.

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150,000

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160,000

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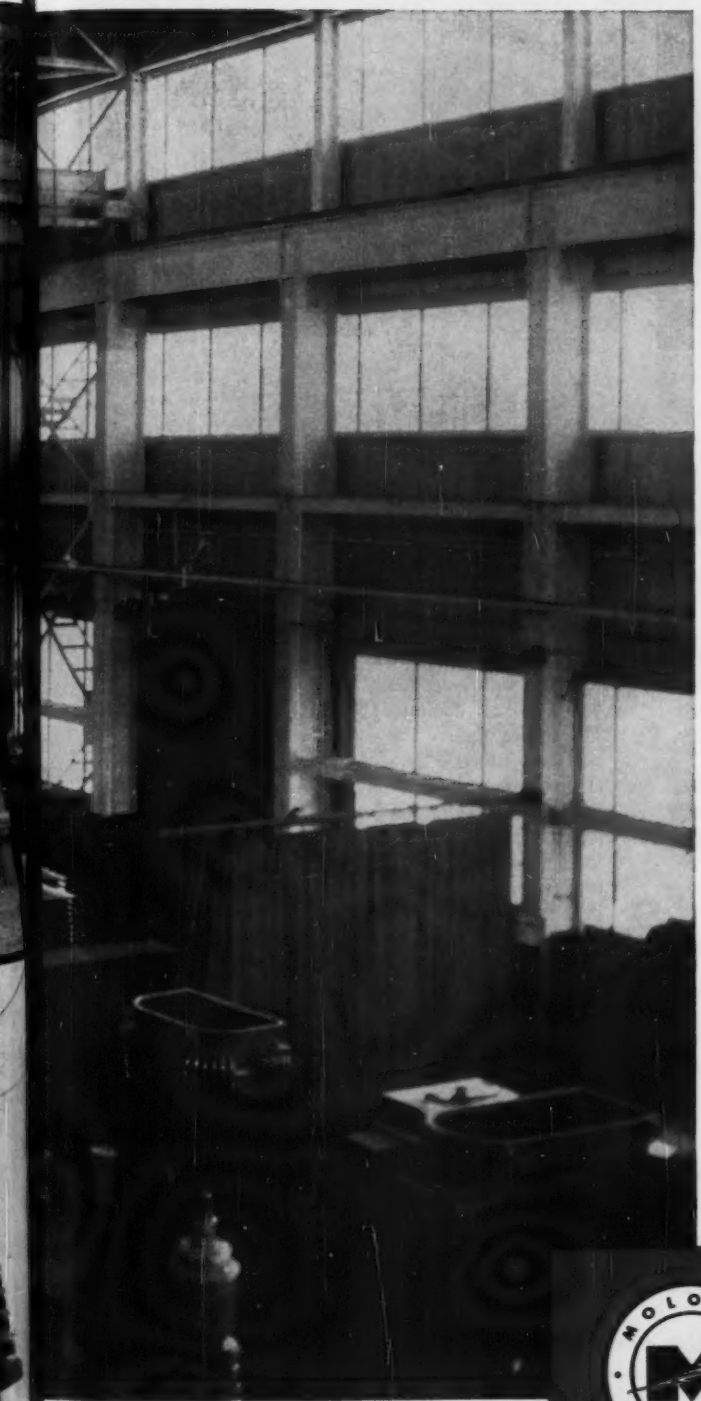
200,000

100,000

230,000

Transformers for

THE NUMBER YOU PICK . . .



depends on carefully calculated system requirements of present and future loads. So too, must the manufacturer of power transformers be chosen, carefully . . . and with an eye to the future.

To this end, careful consideration of Moloney Electric Company's qualifications will reveal these facts:

- Sixty-three years experience in designing transformers of all types and sizes.
- Modern, extensive facilities with the capacity to produce transformers of any size or rating.
- Unexcelled product operating records.
- Continuous research and development to improve transformer design and manufacture.

This ability to design and manufacture efficient, dependable transformers of any rating is a carefully calculated result of Moloney planning and preparation.

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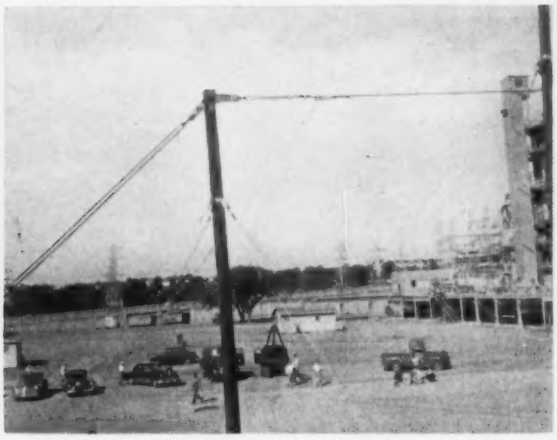


Portable Instrument Assures Safety During Tests

W. F. FULLER, Engineer, Texas Electric Service Co, Fort Worth, Texas

Engineers of the Texas Electric Service Co are using a portable strain indicator that permits all personnel to stand well clear of equipment being tested. The technique assures the safety of men in case equipment under test fails.

The instrument part of the strain indicator is slightly larger than a table model radio. Leads from the instrument are connected to leads from two very fine wires that are imbedded in a band-aid size paper strip which is cemented to the object to be placed under strain. Current is applied to the wires and the circuit is neutralized by adjusting the indicator dial to zero.

Strain is applied to the equipment under test and its stretching or bending changes the resistance of the fine wires that are cemented to it. The instrument works on the galvanometer principle. As the current is applied and the circuit neutralized the amount of change in resistance in the wires is shown by the instrument. By applying formulae the reading is converted to tension or compression of the material being tested. Leads to the instrument can be long enough to permit engineers making the tests to be a safe distance from equipment which may fail under test.

Texas Electric Service Co engineers have used the strain indicator to study pole column strength and guying hardware strength on transmission poles where tensions ran as high as 52,000 lb in the load cable and 69,800 lb in the guy cables. These tests were made for the purpose of developing wood pole structure designs for lines where high conductor tensions were to be used.

On other occasions the strain indicator has been used in developing a new secondary extension bracket, for determining the ultimate strength of various compression sleeves for ACSR conductors, and for measuring the tension in guys supporting microwave towers.

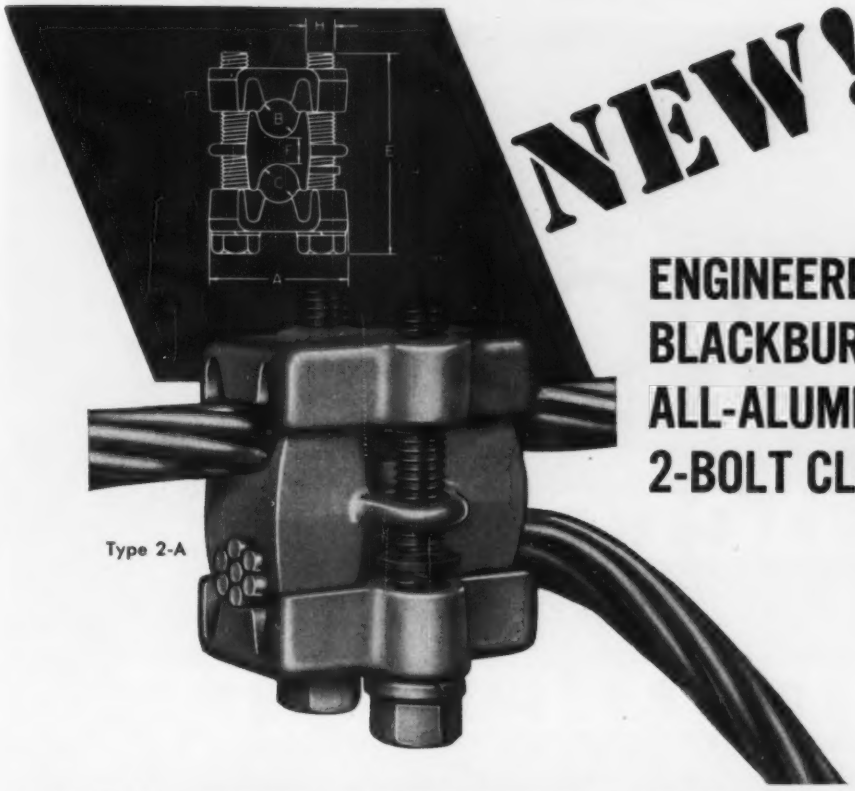
Two Bails Hold Larger Service Cables

ROBERT L. HADICKS, Apprentice Lineman, Kansas Gas & Electric Co, Wichita, Kan.

Two cable-grip bails used in combination by Kansas Gas & Electric Co support large service cables at the pole. Kellems MC 67-1935 cable grips and MC 67-2016 cable bails are used for cables larger than No. 4 aluminum.

Formerly, the large cable grips used with these larger cables were attached to a No. 4 wire loop at the pole. Now, the required long-radius bend of cable at the pole can be handled more easily by hooking two cable-grip bails end-to-end to form a single service cable loop.

(*More Methods on page* 124)



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Contact surfaces guarded by rainshield design of castings—inhibitor will not "wash out" even under driving wind and rain.

Condensation is drained off through ports in castings regardless of installation position—never allowed to accumulate around the conductors.

Designed with hot stick crews in mind.

Massive all-aluminum clamp—including hardware—may be used on aluminum or on copper conductors with inhibiting compound. Extra thick, highly conductive aluminum spacer separates dissimilar conductors for added corrosion protection.

Four clamps accommodate a wide range of wire sizes—main from 6 to 795 ACSR, tap from 8 to 397.5 ACSR. Write for samples and literature.

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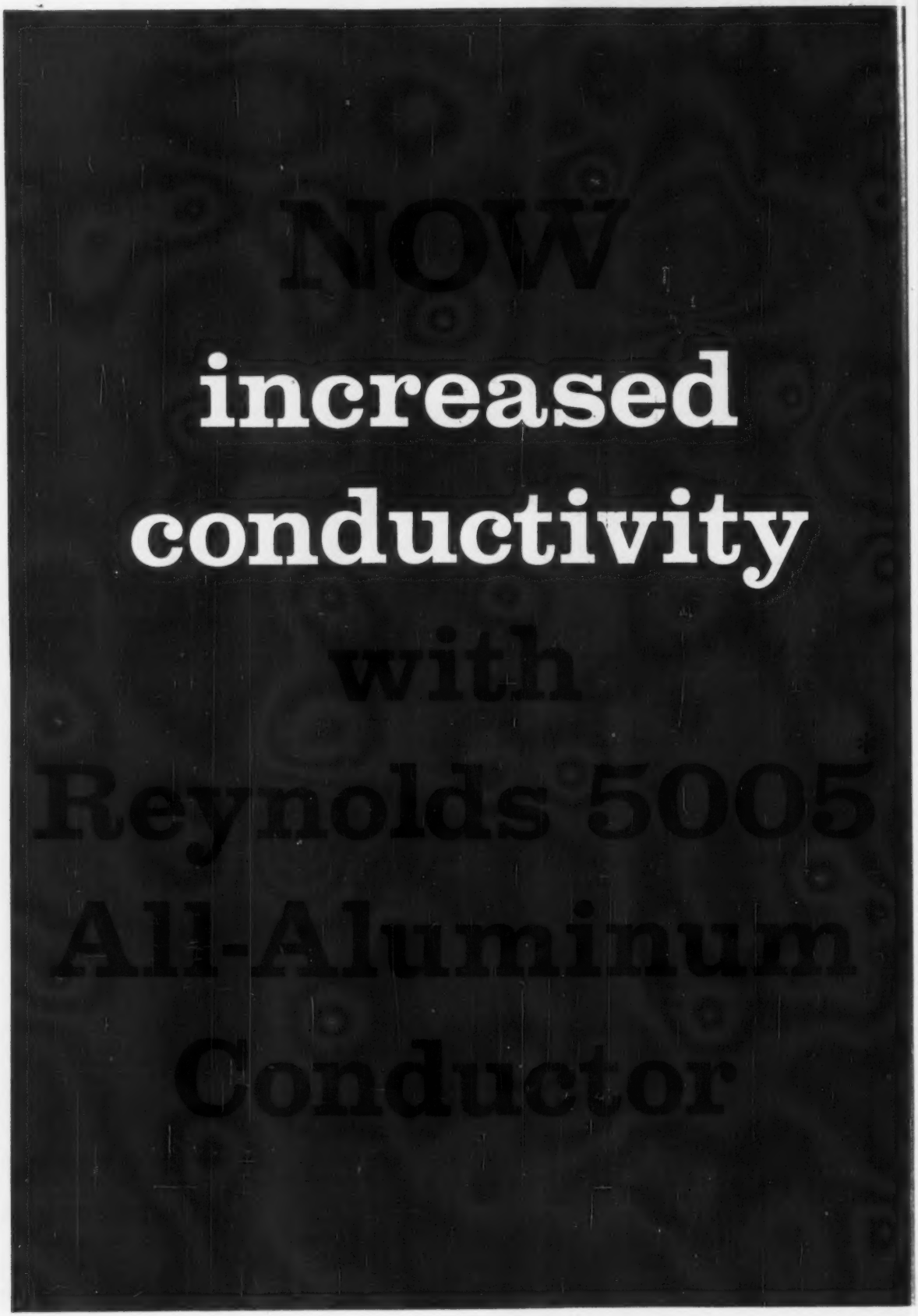
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increased
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Reynolds 5005
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Conductor

You get more conductance at a lower cost than with any other standard conductor of comparable size and strength . . . lower power losses . . . improved voltage regulation . . . increased current carrying capacity

Minimum guaranteed conductivity for Reynolds high strength 5005 All-Aluminum Conductor has been increased from 52.14% to 53.5%. This, along with the other outstanding advantages of 5005, makes it more important than ever that it be considered for your applications. These advantages are LOW COST . . . less than any other conductor with comparable properties. HIGH STRENGTH . . . 5005 is a high strength aluminum alloy and compares favorably in sag characteristics with copper and in many cases with ACSR. EASE OF INSTALLATION . . . no steel core means 5005 is lighter in weight, easier to install, easier to splice. There is no possibility of galvanic corrosion in contaminated atmospheres. BETTER SCRAP VALUE . . . if and when a line is scrapped, the all-aluminum 5005 will bring much higher value. PERFORMANCE PROVED . . . hundreds of miles of 5005 are in service . . . installation experience has been excellent and there have been no service problems.

Investigate the advantages and economies of 5005 today. Complete data on Reynolds 5005 Aluminum Cable physical and electrical characteristics, sag and tension properties, is available from your local Reynolds branch office or your Reynolds Electrical Distributor. Or, write *Reynolds Metals Company, P. O. Box 2346-EL, Richmond 18, Virginia.*

* *5005 is a high strength all-aluminum alloy conductor developed by Reynolds. It compares with copper in sag . . . costs no more than ACSR. Write for brochure.*

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Replacement Engines Speed Service

NIGHT CREW removes engine that needs overhaul. This crew also removes other major parts scheduled for repair

OVERHAULED ENGINE is installed by night crew which also handles minor repairing and servicing of vehicles

DAY CREW overhauls all engines and other major parts and adds them to spare supply for installation later

Many advantages have been realized through the system developed for servicing Indianapolis Power & Light Company's automotive fleet. There are no spare vehicles and yet major repairs are handled by daytime crews of mechanics without inconvenience or delay to crews or others using the vehicles.

There are 250 vehicles, trucks and cars in the fleet and 150 other pieces of equipment. Minor repairs and servicing are handled by a night crew. The day crew in the garage does major repairs and engine overhauls.

The schedule is made possible because spare engines and spare major parts are kept on hand. When an engine, or transmission or differential or other major part needs overhaul, the night crew in the garage removes it and then installs a unit that has been completely overhauled. The day crew overhauls the old engine or part and gets it ready for installation in another vehicle when it is needed.

This also makes it possible to have a minimum crew working at night, which has proved popular.

Hold Forms With Log Chain

HOWARD HUMPHRIES, Construction Supt, Connecticut Light & Power Co, Berlin, Conn.

Use of a chain to hold wood forms for tower footings and other concrete structures saves time and material costs for Connecticut Light & Power Co. Panels cut to proper size and shape from rough lumber are tacked in place. A log chain with a snap hook is wrapped around the assembled form, with wedges set under each chain to keep it from sliding up. Chains are tightened with a come-along. Forms can be used on up to 24 towers before needing replacement.

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Procurement & Products

PUBLIC BIDDING ▶ **The Senate Anti-Monopoly Subcommittee got a full explanation** of hundreds of instances of identical bidding on purchase contracts offered by the Tennessee Valley Authority and municipal utilities in the TVA area. The explanation was simple and obvious: The identical bids were based on published list prices which had been furnished by suppliers in advance of the offerings. The bids were all on standard, catalogue items.

The explanation emerged from the testimony of purchasing officials for TVA and the municipals during the three-day hearing recently conducted by the Senate group in Knoxville, Tenn. Almost to a man, the purchasing officials called for a greater variety in bids, but when it came to recommendations for avoiding the repetition of identical bids, they had little to offer.

"I think if I had a chance to negotiate these contracts, I might save a little money," offered C. B. Quinn, assistant director of purchases of the Memphis Division of Light, Gas and Water. But under law, TVA and most of the municipals are required to advertise for bids and award contracts to the lowest acceptable bidder.

In making an award in the case of identical bids, preference is sometimes given to local jobbers. In other cases, the award is made by drawing lots or flipping a coin.

PURCHASING ▶ **Growing stature of the purchasing executive** has forced sales and marketing programs to be keyed toward "selling at the management level," reports Purchasing Week. From interviews with sales and marketing executives attending the annual marketing conference of the National Industrial Conference Board, the magazine also concludes: "With more technically-trained men now in the purchasing job, salesmen must be product and material experts."

OUTLOOK ▶ **The post-strike business outlook is bright.** According to McGraw-Hill's Department of Economics, the index of industrial production will average around 156 for the fourth quarter, end the year at about 160. In the first quarter of next year, it could go up to 163.

Biggest hurdle will be the shortage of money, which has pushed financing costs to a 30-year high. Demand for cash will become even heavier as steel becomes available and manufacturers bring their inventories back into line.

News of Manufacturers ..... page 128
Manufacturers Literature ..... page 133
New Equipment ..... page 134

Pemco

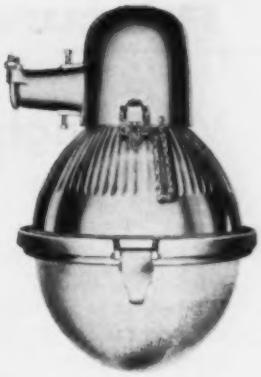
INCANDESCENT STREET & HIGHWAY LUMINAIRES

are better than ever

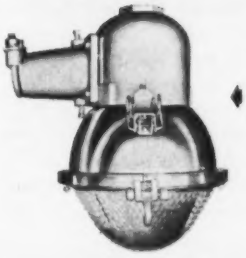
COMPLETE LINE · TOP QUALITY

PEAK PERFORMANCE

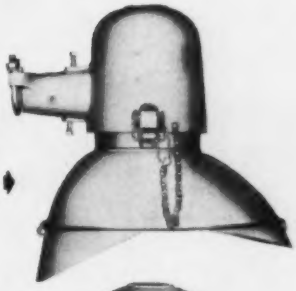
PEMCO Style 80 Standard Enclosed Luminaire—1¼" or 2" slip fitter—All IES types—For 2,500 to 10,000 lumen lamps—Available with wet process porcelain bushings for external wiring — Automatic latching or wedge band.



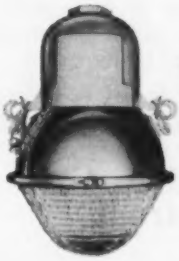
PEMCO Style 20 Standard Enclosed Luminaire — top entrance 1¼" — All IES types—For 2,500 to 10,000 lumen lamps — Available with wet process porcelain bushings for external wiring — Automatic latching or wedge band.



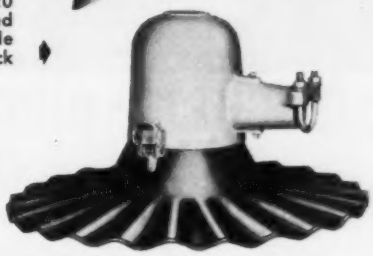
PEMCO Style 51 Junior Enclosed Luminaire — 1¼" or 2" slip fitter—All IES types—For 1000 to 2500 lumen lamps—Automatic latching or wedge band.

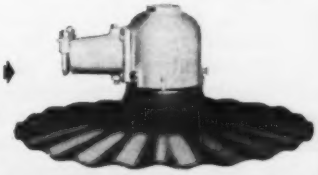


PEMCO Style 80 Standard Open Reflector Luminaires —1¼" or 2" slip fitter—For 1000 to 2500 lumen lamps. Available with wet process porcelain bushings for external wiring—Also manufactured with Style 20 Top Entrance Head tapped 1¼". Adapters available for use with screw neck reflectors.



PEMCO Style 50 Junior Enclosed Luminaire — top entrance tapped ¾", 1" or 1¼" — All IES types—For 1000 to 2500 lumen lamps — Automatic latching or wedge band.





PEMCO Style 58 Junior Open Reflector Luminaire—1¼" or 2" slip fitter—For 1000 to 2500 lumen lamps. Also available with Style 57. top entrance junior head tapped ¾", 1" or 1¼". Can be supplied with bail latch reflectors.

ALL PEMCO SIDE ENTRANCE HEADS AVAILABLE WITH NEMA STANDARD ADAPTER FOR PHOTO-ELECTRIC CONTROL.

★

PEMCO STANDARD HEADS CAN BE SUPPLIED WITH BUILT-IN TRANSFORMER FOR USE WITH 100 & 175 WATT MERCURY LAMPS.

★

COMPLETE PERFORMANCE DATA ON PEMCO STREET & HIGHWAY LUMINAIRES AVAILABLE.

Other Pemco Products Include: Mercury Street Luminaires, Fluorescent Street Luminaires, Poles, Brackets and Accessories, Sub-Station and Protective Lighting, Service Station, Flood and Area Lighting. Catalogs on Request.

PHILADELPHIA ELECTRICAL & MANUFACTURING COMPANY

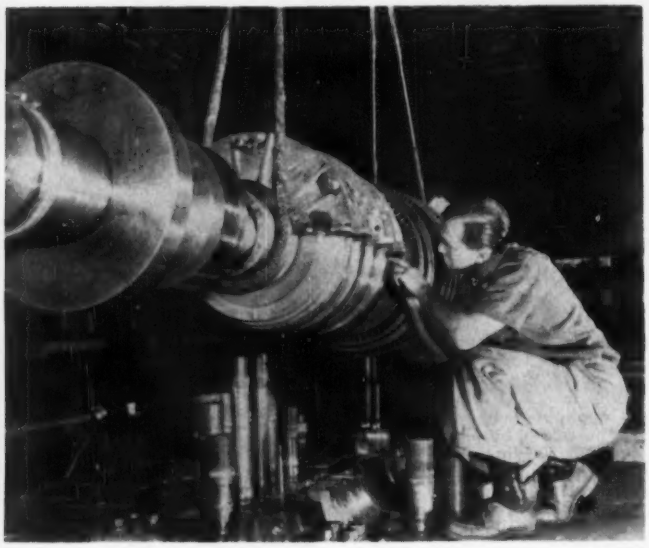
1200-36 N. 31st Street, Dept. E — Philadelphia 21, Pa.

PEMCO LIGHTING HAS BEEN QUALITY LIGHTING SINCE 1882

Westinghouse Ships Superpressure Turbine

Spindle of the 325-Mw superpressure turbine built by Westinghouse Electric for Philadelphia Electric's Eddystone station is being inspected (left) before shipment to the utility.

The unit is a cross-compound type, with the superpressure, very high-pressure, and high-pressure elements operating at 3600 rpm. Designed with two stages of reheat and containing nine extraction stages, the system will heat feed water regeneratively to 558 F at rated output, with the temperature increasing to 576 degrees F at the discharge of the high boiler feed pump at maximum load.



The first stage of the superpressure element operates with complete admission at all loads. Steam at 5000 psig and 1200 F is supplied through four inlet lines.

Technical problems involved in building a turbine to use steam at the high density and high temperature led to design of a separate superpressure element in a small spherical casing. The superpressure rotor weighs only 4,000 lb, while this element will produce 44-Mw output.

In passing through the full cycle, steam will be reheated twice at 1050 F. The main flow of steam from the turbine stop valves is, in series, through the superpressure and the very high-pressure elements, the first reheat stage, the high-pressure turbine stages, the second reheat stage, and finally through the intermediate and low-pressure turbines to the condenser.

The superpressure element is connected in tandem with the vhp-hp element to drive an inner-cooled 3600-rpm generator which is rated at 184,300 kva at 0.85 power factor with a hydrogen pressure of 45 psig. The HP and two single-flow LP elements are connected in tandem to drive an 1800-rpm inner-cooled generator rated at 231,700 kva at 0.85 power factor with hydrogen pressure of 45 psig.

The Eddystone turbine will pass two million pounds of steam per hour. Arrangement of the regenerative cycle will result in an extraction of 800,000 lb per hr from the turbine to the feed-water heater system.

New Preformed Telemetering System Measures Stress

Preformed Line Products has introduced a system designed for general purpose telemetering applications, special feature of which is adaptability to measurements of stress in high tension power lines.

The system is a supplement to DYNALAB, developed by Preformed in cooperation with Radiation, Inc, a year ago. The new system consists of two parts: a battery powered telemetry transmitter and transducer fastened to the line under test, and a telemetry receiving station located in a vehicle stationed near the wire.

The transmitter is fastened securely to the line under test when in use. A vibration-sensitive bridge transducer modulates the transmitter output, producing an FM/FM signal which is transmitted to the ground. The receiving facility consists of two telemetry receivers and a dual channel recording oscillograph, permitting stress measurements on two lines simultaneously. Line vibration may be observed on an oscilloscope, or with a modulated audio note.

Since there is no direct connection from the power line to the measuring and observation point, stress measurements may be made with high voltage on the line. Tests made at the University of Oregon established the fact that measurements can be made with line potentials in excess of 600 kv. Suitability of the system to application where it is desirable to make tests without disruption of power was verified by several patrol operations throughout the country. Rugged construction of ground vehicle permits use of the system in remote and previously inaccessible areas.

However, the system is essentially a means of data transmission, and is by no means limited to stress measurements useage. Proven applications of the system include, in addition to power line stress measurements: accelerometer measurements, tension, damping index, and temperature measurements.

(*More Manufacturers News, p* 132)

oday's smallest two-way mobile radio - actual size!

New General Electric Transistorized Progress Line

General Electric's new Transistorized Progress Line will fit in more places, in more different positions, than any other two-way mobile radio you can buy today.

Not only is this the world's smallest, lightest commercial two-way mobile radio, but standby battery drain is so low you need never turn off your TPL mobile unit, just like the clock in your car. You install no special generator, use less gas, require fewer engine jobs.

TPL is the first two-way radio that transmits up to 75 watts of power in high band . . . the first that really fits under the dash . . . the first to realize the full benefits of transistorized design (no more than four tubes) . . . the first to eliminate bulky cables through new one-piece design of receiver control and transmitter . . . the first with shielded dirt-free ventilation.

The new General Electric TPL ushers in a new era of convenience and reliability in mobile communications. Don't miss all the exciting details. Write General Electric Company, Communication Products Department, Section 9109-20, Mountain View Road, Lynchburg, Virginia.

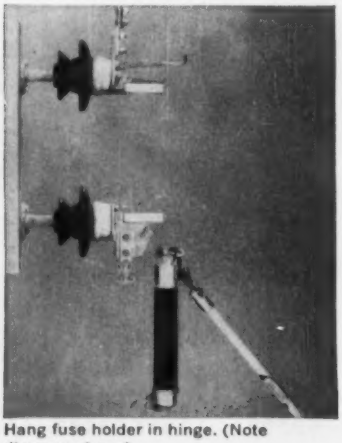
GENERAL ELECTRIC

Communication Products Department

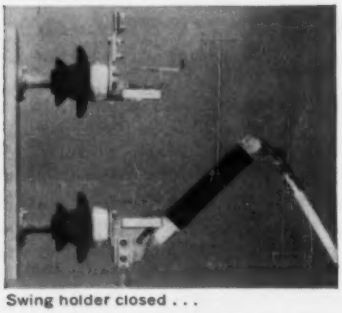
LOW-COST SWITCHING

HOW THE SM-4 SWITCHES

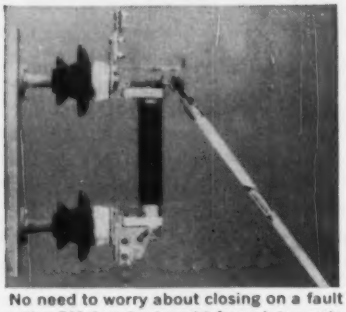
Photo at right shows the fuse being opened with Loadbuster. Photos below show closing sequence with conventional handling tool.



Hang fuse holder in hinge. (Note disconnect gap) . . .



Swing holder closed . . .



No need to worry about closing on a fault —the SM-4, a boric acid fuse, interrupts effortlessly.

Now even power fuses operate with S&C's Loadbuster® — no need to add a disconnect

That's right . . . no disconnect required! If it's S&C's outdoor SM-4 Power Fuse, you switch with the fuse itself—plus Loadbuster.

On transformer primaries there's no separate investment in disconnects for energizing, or for de-energizing and isolating. For line sectionalizing the same holds true—and then some! With Loadbuster it's possible to drop the line, split the load, even dump the load—up to 14.4 kv.

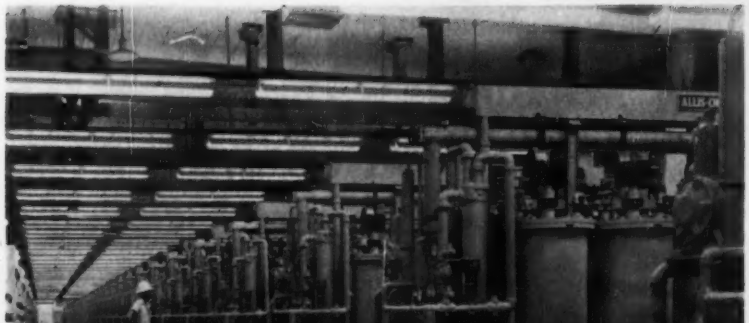
Here's how it works. The SM-4 Power Fuse is equipped with an attachment hook to accommodate Loadbuster. Just hook Loadbuster onto this hook and into the pull ring, pull fuse open and the circuit is interrupted. Result: full load switching at full voltage with no arcing, no contact burning. In one device you get full switching and isolation as well as fault protection.

The key to the Loadbuster system of universal, low cost load switching? Portability! . . . bringing the interrupting device to the power fuse, disconnect, or cutout only when it's needed. In this way the cost of Loadbuster is spread over all the fuses, disconnects, and cutouts on the distribution system.

For more information contact S&C Electric Company, 4421 Ravenswood Avenue, Chicago 40, Ill. We will be glad to give you a demonstration of how Loadbuster works.

S&C ELECTRIC COMPANY

S&C



A-C Installs Mercury-Arc Rectifiers

Allis-Chalmers supplied 48 mercury-arc rectifier units for Reynolds Metals' aluminum reduction plant at Massena, N. Y., (see above). Units supply three potlines, each rated 80,000 amp, 850 dc, for reduction of aluminum oxides into pure aluminum. At left are all-aluminum twin control cubicles supplying auxiliary power and excitation control.

MANUFACTURERS BRIEFS

Westinghouse announces an expansion program designed to double the capacity of its Reactor Evaluation Center near Waltz Mill, Pa. The expansion, which is expected to be completed early next year, will allow the Center to accommodate the largest nuclear cores currently foreseen by the company. . . .

Anderson Electric has completed plans for a new office building to expand and consolidate its general office facilities in a new "home office" building. New location will be adjacent to its aluminum casting foundry at Leeds, Ala . . . **Allis-Chalmers** plans to acquire Valley Iron Works Co, manufacturer of paper-making machinery as wholly-owned subsidiary about Oct. 30, subject to final approval by Valley stockholders . . . **General Electric's** new internal automation operation functions as "an independent consultant firm," examining company operations and making recommendations as to where and how to take

WHY G-E FUSE LINKS GIVE MAXIMUM SYSTEM PROTECTION

By D. L. McINTIRE—Lightning Arrester and Cutout Product Planning Specialist

General Electric universal fuse links give you maximum overcurrent protection on distribution systems. Designed for use in every type of cutout, these fuse links are available in fast (K), slow (T), EEI-NEMA Types from one to 100 amperes, and high-surge links up to eight amperes. Ratings of 140 and 200 amperes are available in the solid-head type only.

General Electric universal fuse links offer you these important advantages:

Premature melting is eliminated by silver plating threaded parts to maintain low contact resistance.

Efficient low-current operation is assured by the bonding process and a specially prepared paper in the auxiliary tube.

Fuse withstands continuous overcurrents. General Electric EEI-NEMA fuse links will withstand continuous overcurrents of approximately 150 percent of rating.

Instant separation is assured by new internal spring that prevents cable fouling inside the auxiliary fuse tube.

Drop-out interference is eliminated by the use of a flexible cable. Fine-stranded cable can be used since the G-E fuse element has excellent temperature control.

Like more details? Contact your G-E Sales Engineer today, or write to Sect. 435-23, General Electric Co., Schenectady, N.Y.

GENERAL ELECTRIC

Overcurrents are in

greater advantage of automation. It is headquartered in Schenectady, as part of the specialty control department . . . Pact between **Worthington** and union locals at eight of the company's divisions on September 25 brought 60-day extension of contracts and return to work of 3,400 employees who struck on September 15. Original contracts expired early in June, but employees, members of United Steelworkers Union and International Association of Machinists, continued working until September 15 under several extensions . . . **General Electric** will build 66 electric locomotives, valued at about $32 million, for Pennsylvania Railroad under a long-term lease arrangement . . . **Allis-Chalmers** is in process of touch-up painting and final assembly of stator for 100-Mv steam turbine-generator unit for Wisconsin Power & Light's new Nelson Dewey station at Cassville, Wis. The 1450-psig, 1000 F throttle steam unit with single reheat to 1000 F, when placed in service later this year, will be largest of its type in Wisconsin, says A-C.

MANUFACTURERS LITERATURE

THERMOCOUPLE WELLS . . . and complete assemblies. Includes data on well designs and dimensions, pressure and temperature ratings, corrosion data, thermocouple assembly data, and ordering and pricing information. Catalog G102-1. Minneapolis-Honeywell Co, Wayne and Windrim Aves, Philadelphia 44, Pennsylvania.

REDUCED-VOLTAGE STARTERS . . . when and where to use, and how to select among manual autotransformer, magnetic autotransformer, primary resistor, and part-winding starters. Schematic connection diagrams for each. Bulletin GEA-6860, 8 pages. General Electric, Schenectady 5, N. Y.

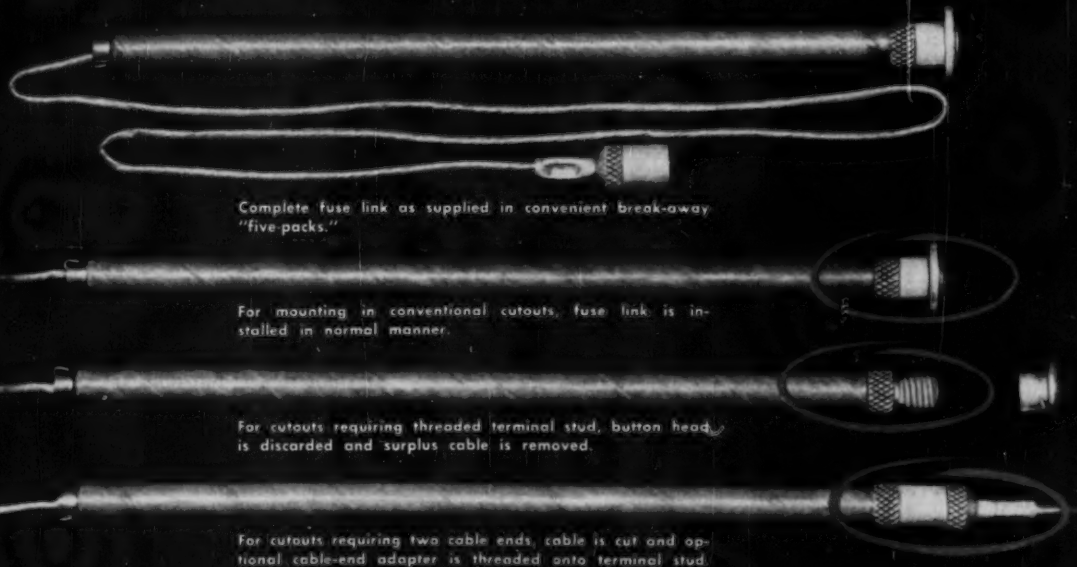
JIB CRANES . . . square column, with capacities from 3 to 15 tons, 360-deg swing. Can be supplied with manual or power rotation. Power rotated models can be equipped with limit switches when full swing is not desired. Bulletin No. 405-A, 4 pages. R. G. LeTourneau, Inc, Longview, Tex.

PRINTING DEMAND METERS . . . PD-55F and PD-57F with up to 999 impulse capacity, with new single pressure-sensitive tape which gives easily read, permanent records. Case of draw-out construction. Complete detail on both meters, with diagrams. Bulletin GEA-6892, 8 pages. General Electric Co, Schenectady 5, N. Y.

VAPOR DEGREASING . . . Nialk trichlorethylene for vapor degreasing and other uses. Operating procedures for degreasing equipment using the chlorinated solvent; basic cleaning cycles described. Practical suggestions to prevent or cure common operating difficulties. Graphs and tables. Booklet No. 44-A, 36 pages. Hooker Chemical, Box 344, Niagara Falls, N. Y.

POLE LINE HARDWARE . . . items and construction specialties are listed in a loose-leaf condensed version, with products in alphabetic sequence. Catalog No. 59. Oliver Electrical Mfg Co, 170 Angell St, Battle Creek, Mich.

interrupted quickly—effectively, by
General Electric universal fuse links



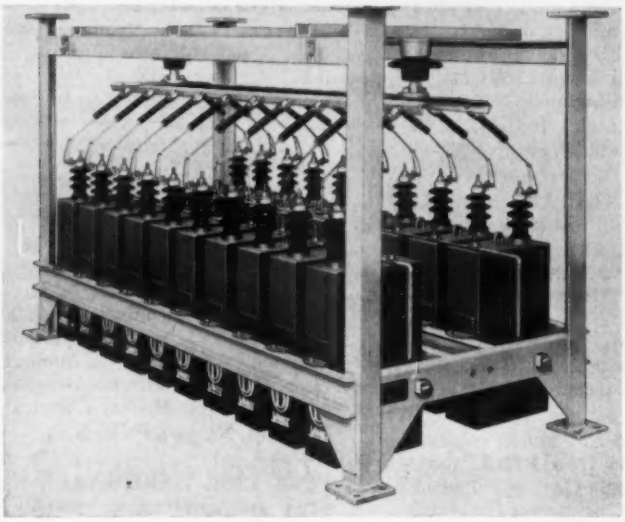
Complete fuse link as supplied in convenient break-away "five-packs."

For mounting in conventional cutouts, fuse link is installed in normal manner.

For cutouts requiring threaded terminal stud, button head is discarded and surplus cable is removed.

For cutouts requiring two cable ends, cable is cut and optional cable-end adapter is threaded onto terminal stud.

GENERAL ELECTRIC



Capacitor Racks . . .

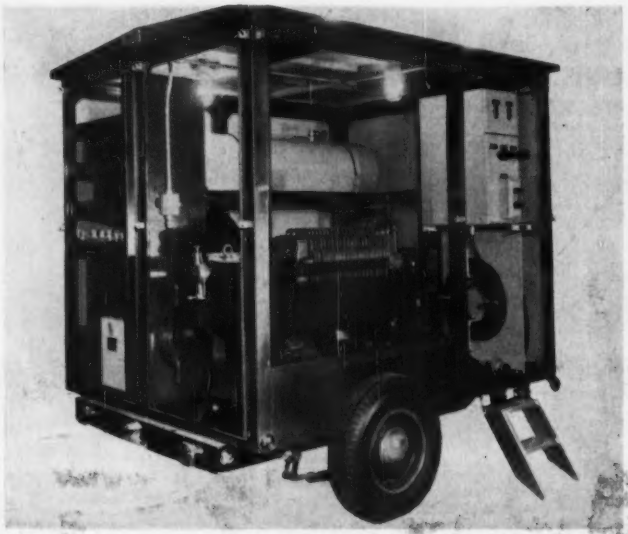
. . . of light weight aluminum are factory assembled. They include both stacking racks for substation installations and in-line and twin-line racks for pole-mounted equipment. The 6061-T6 aluminum equipments provide excellent protection against all corrosive elements. High speed jig welding makes strong and neat joints.

Ohio Brass Co, Mansfield, Ohio.

Three-Stator Meter . . .

. . . with 200-amp capacity measures 4-wire wye services. Known as Model P3, the meter completes the company's line of P polyphase meters. It has sectionalized construction and is easily calibrated. Its single disk, round design cuts both weight and volume by 50% compared to bathtub-type 3-stator meters. The meter is furnished in both socket-mounting and bottom-connected models.

Sangamo Electric Co, Springfield, Ill.

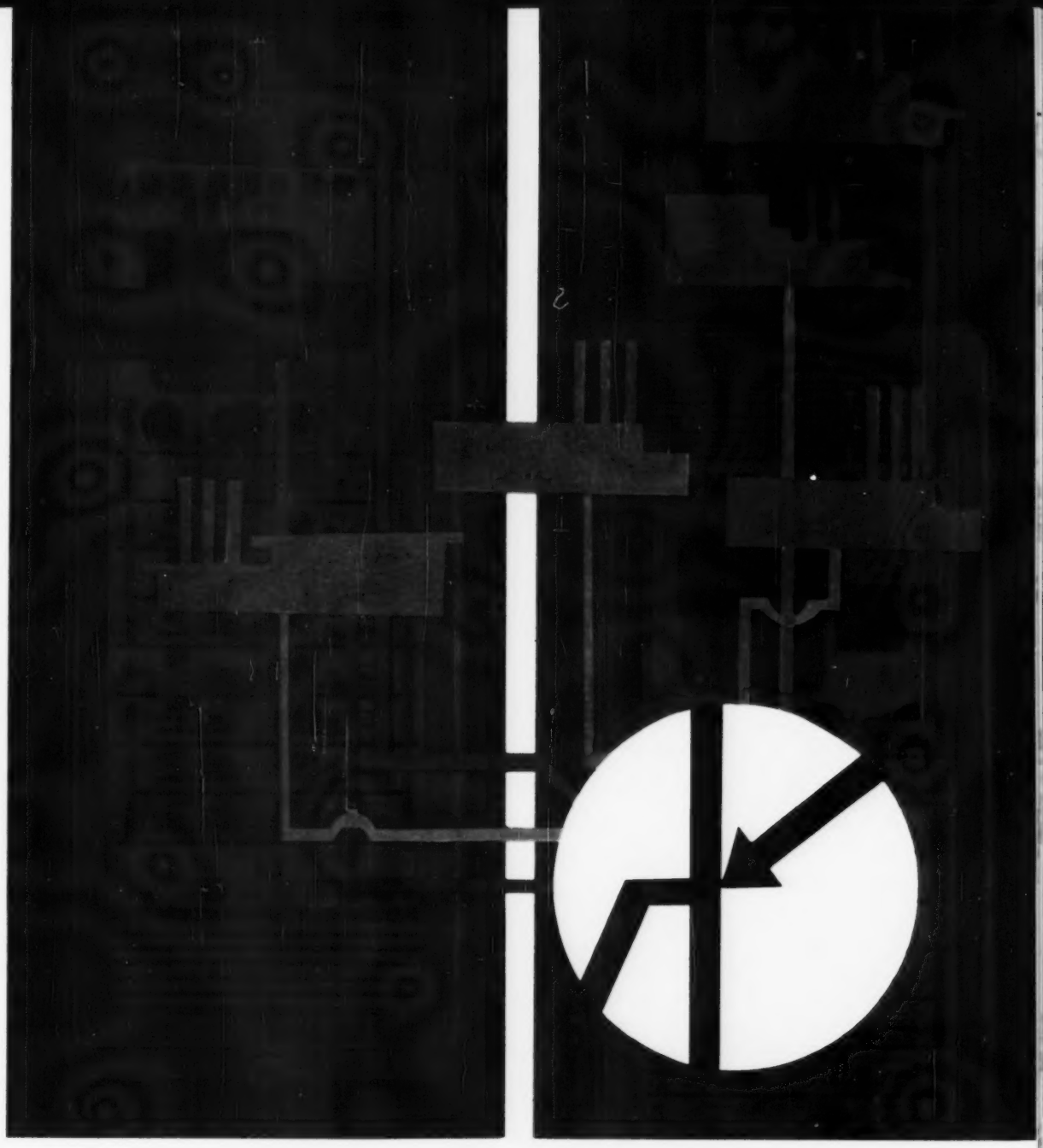


Trailer . . .

. . . houses oil purifying equipment for transformer and circuit breaker oil. The trailer contains an 1,800 gal per hr purifier of the filter press type. An air compression tank to check for leaks, an oil storage tank, piping and hoses, a portable electric filter paper drying oven and a portable 35,000-v oil test set are also included. The enclosure is both water and dust tight, and both sides and end panels are readily removable.

Switchgear Dept, Northeastern Engineering, Inc, Box 150, Manchester, N. H.

(*More New Equipment on page* 137)



new—from Westinghouse—a fully transistorized totalizing relay

The NEW, exclusive Westinghouse "WT" Totalizing Relay is an all-transistorized, errorproof "electronic brain." It reliably totalizes from three to seven circuits—and eliminates all types of maintenance common to mechanical relays with moving parts. There is nothing to wear, adjust or inspect—year after year.

The "WT" fits into any power distribution system with a minimum of installation problems, space and costs. The operation is fully compatible with your present system. Ask your Westinghouse sales engineer to show you how the "WT" can assure you of accurate, trouble-free impulse totalizing. And continue to watch Westinghouse meters for the Bonus Value Beyond Specifications.

YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS-TV MONDAYS

Check these EXCLUSIVE Bonus Values of the new Westinghouse "WT" Totalizing Relay

SLASHES MAINTENANCE—

There are no moving parts to wear out, to be replaced, to require adjustment

RELIABILITY—

All-transistorized, errorproof electronic brain

COMPACTNESS—

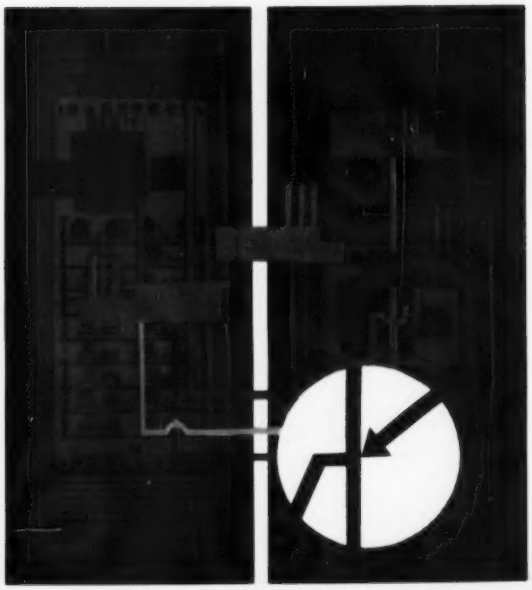
Mounted in standard Flexitest* case—measures only 16½ in. x 6⅜ in. x 7⅝ in.

MAXIMUM VERSATILITY—

Can be applied in any system to which totalizing relays are applicable

* Trade-Mark

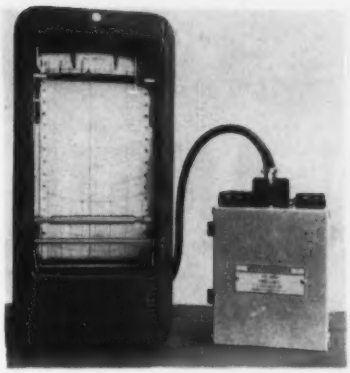
Watch the mail for this brochure, or get one from your Westinghouse sales engineer. It shows why Bonus Value is an important part of every Westinghouse meter development.



YOU CAN BE SURE...IF IT'S

Westinghouse

JI-40517



Contactor . . .

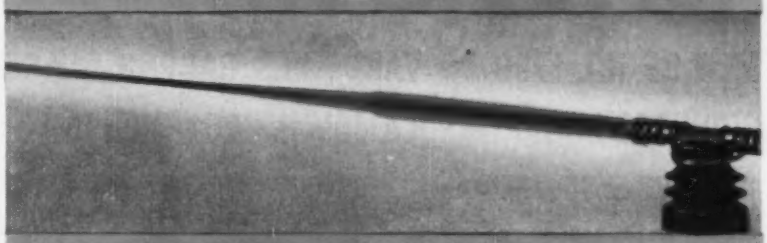
. . . for recording instruments is transistorized. The two-limit contactor (Type VS 860) is used on the Type 44 recording instrument to actuate external breakers or switches and provide automatic circuit monitoring. The burden on a 115-v, 60-cycle power supply is less than 1 w. The contactor is called "Trans-O-Limit" controller.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

Alarm Panel . . .

. . . simultaneously monitors up to 100 temperature points. The Simultaneous Temperature Alarm Readout (or S-T-A-R) is so designed that when any one of the points being sensed reaches the temperature indicated on its control dial, an alarm is sounded, and the critical point identified by a numbered light on the control panel. The actual temperature of any point, normal or off-normal, may be determined by first

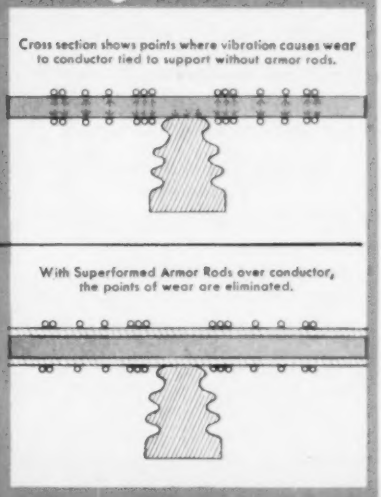
(*Continued on page* 141)

TAKING THE PUNISHMENT OF WIND VIBRATION



FANNER *Superformed* ARMOR RODS

CUSHION CONDUCTORS against DAMAGE!


Cross section shows points where vibration causes wear to conductor tied to support without armor rods.
With Superformed Armor Rods over conductor, the points of wear are eliminated.

Even at low wind velocities, overhead lines are often subjected to thousands of stress reversals per minute due to aeolian vibration.

With Fanner Superformed Armor Rods installed at points subject to stress and abrasive wear, the conductor receives the best protection against vibration damage as well as electrical burning . . . and many expensive line repairs are eliminated.

Fine FANNER Superformed Products

ARMOR RODS · FANNSPLICES · FANNGRIPS · LINEGUARDS · PATCH RODS · TAP ARMOR · PLASTIC FANNGUARDS · KOVERGARD MOLDINGS

THE FANNER MANUFACTURING CO.
BROOKSIDE PARK CLEVELAND 9, OHIO
Electrical Products Division

*Trademark

Licensed for use under or made in accordance with one or more of the following patents: Patent No. 2,567,521, 2,708,678, 2,908,883 . . . Other patents pending.

Cable News from

A NEW INSULATION AND A

NEW GE NO. 1799 DG VARNISHED DACRON GLASS PROVIDES MAJOR INSULATION IMPROVEMENTS

The new GE No. 1799 DG varnished Dacron glass insulation offers these major improvement values in varnished cloth-insulated cables:

Longer Life

- Lower electrical losses
- Better heat and moisture resistance

Ease of Handling

- Smaller over-all diameter

Reduced Insulation Thickness

- Greater dielectric strength
- Greater mechanical strength

Greater Current-carrying Capacities

- 0 to 15 kv—85 C conductor temperature
- 23 kv—80 C conductor temperature

Excels in test comparisons

Test comparisons between varnished Dacron glass insulation and varnished cotton are shown in the table at right. Of particular importance to cable users are those results which show that GE No. 1799 DG varnished Dacron glass insulation:

. . . has almost 20% greater dielectric strength than varnished cotton in a dry condition, much greater dielectric strength in extreme humidity.

. . . changes dielectric strength relatively little when stretched and when ambient temperatures vary widely.

. . . has stable power factor at much lower values than varnished cotton.

. . . will not tear lengthwise, and has almost three times as much crosswise tear resistance as varnished cotton.

Physical and Electrical Properties of Tapes

Typical Values	GE No. 1799 DG	GE No. 1799 VC
Tear Strength — Grams		
Lengthwise	Does not tear	208
Crosswise	708	270
Dielectric Strength — Volts Per Mil		
IPCEA Method—Room Temp	1420	1220†
(step by step) 85 C	1200	1065*
Short Time Method Dry —	1974	1574
96 hours in 96% humidity	1386	740
6% Elongation	1812	1200
12% Elongation	1755	700
Per Cent Power Factor		
Temp 30 C	2.3	6.9
Temp 80 C	3.5	9.2
Temp 100 C	6.7	13.4
Per Cent Moisture Absorption 96 hours at 96% humidity	0.64	1.9
Per Cent Water Absorption 96 hours in water 25 C	0.82	5.7

†Industry standard—1000 v/mil
*Industry standard— 750 v/mil

Complete cables tested

Load cycle over-voltage aging tests were carried out to indicate in-service reliability of the new insulation. Cables insulated with GE No. 1799 DG varnished Dacron glass, rated 15 kv, were subjected to voltages of 150% and 175% of the rated voltage. The cables were cycled simultaneously from room temperature to 90 C and from room temperature to 100 C.

Extensive tests of this nature on finished cables and in field service installations confirm the excellent improvement values offered to cable users by this new General Electric insulation.

Tape properties are greatly improved by G-E fabrication methods

Use of glass and Dacron, plus complete impregnation of the fabric with varnish, are primary reasons why G.E.'s new insulation offers longer life, easier handling, reduced insulation thickness, and greater current-carrying capacities, plus increased resistance to heat, corona, and moisture.

New pressure process

The base cloth consists of a woven fabric utilizing Dacron fibers and glass fibers, combined in accordance with rigid G-E specifications. It has a minimum of sizing to assure thorough impregnation of the fabric. Impregnation is accomplished through a pressure process which completely controls varnish viscosities, oven speeds, baking temperatures, and the conditioning of the base cloth.

Made only for cables

The G-E varnish is a high-grade, asphalt base, heat- and corona-resistant product. It's made by G.E. specially for use in cable insulation. Another advantage of the varnish is its "oiling out" characteristics which leave an oily film on the surface of the finished insulating cloth. This film serves as a lubricant to protect against tape tears due to bending of the cable during installation.

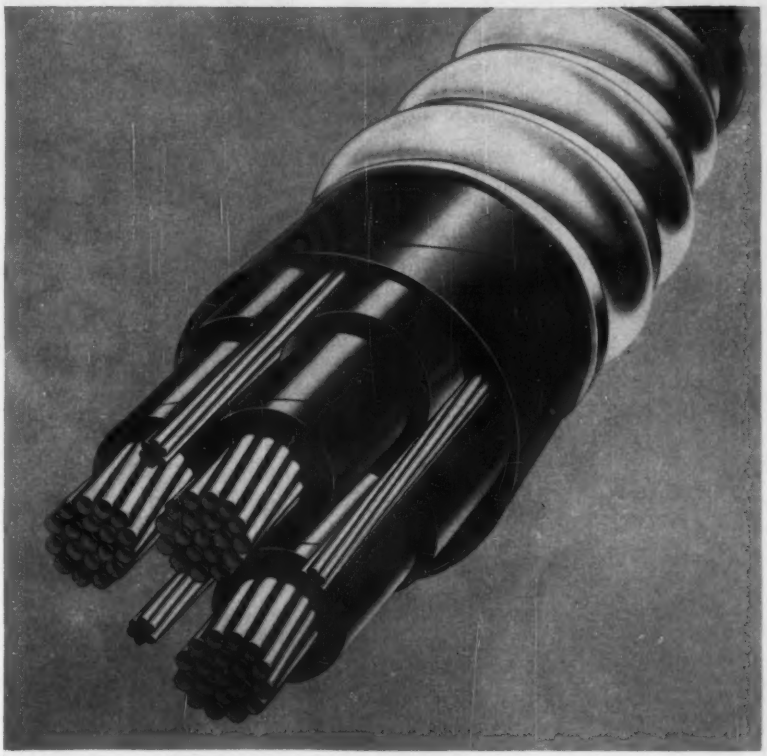
General Electric is the only wire and cable manufacturer that prepares its own varnished cloth, using materials and processes developed in its own laboratories.

Progress Is Our Most Important Product

GENERAL ELECTRIC

General Electric

NEW CABLE CONSTRUCTION



NEW CONSTRUCTION GIVES ADDED VALUES TO G-E INTERLOCKED ARMOR CABLE

New features have been added to the construction of G-E Interlocked Armor Cable — GE No. 1799 DG varnished Dacron† glass tape insulation, Flamenol* jackets on individual conductors, and built-in ground wires. Here are the advantages of each:

1) Varnished Dacron glass insulation: Offers outstanding electrical stability and low-moisture absorption. Reduces insulation thickness, permits higher conductor temperatures. No shielding is required up to 8,000 volts.

2) Flamenol jackets: Protect insulation against moisture, flame, oils, acids, alkalies, ozone, and weather. Provide phase identification by numerals. Simplify terminating and splicing on non-shielded cables . . . only a lug and end seal are required.

3) Built-in ground wires provide a low-resistance ground circuit, a low-reactance fault return path, a positive relaying circuit, and positive and convenient equipment grounding.

These important new features are now added to the time-proved advantages of General Electric interlocked armor cable in a General Electric interlocked armor cable system — lower material cost, reduced space requirements, reduced materials handling, ease of installation, reduced installed costs. For further information on these new cables, just send in the coupon.

Complete line of cables with new insulation now available

These cables with GE No. 1799 DG varnished Dacron glass insulation are now available:

SI-12348: 600-volt power cable
SI-12350: 5000-volt power cable

Single or multi-conductor. Either braided over all for open wiring or installation in conduit in dry locations; or lead-sheathed for installation in conduit or ducts in wet locations.

SI-12381: 15-23 Kv Power Cable

Three-conductor. Lead sheathed for installation in conduits or ducts in wet locations.

Armored Cables — Submarine, Dredge, Borehole

Three-conductor, lead-sheathed for moisture protection; wire armored for mechanical protection under water and for vertical suspension.

Aerial Cable

Three-conductor, individually insulated and jacketed, preassembled to the messenger.

*Registered Trade-mark General Electric Company.
†duPont Registered Trade-mark.

General Electric Company
Wire and Cable Department
Section W244A-1027
Bridgeport 2, Conn.

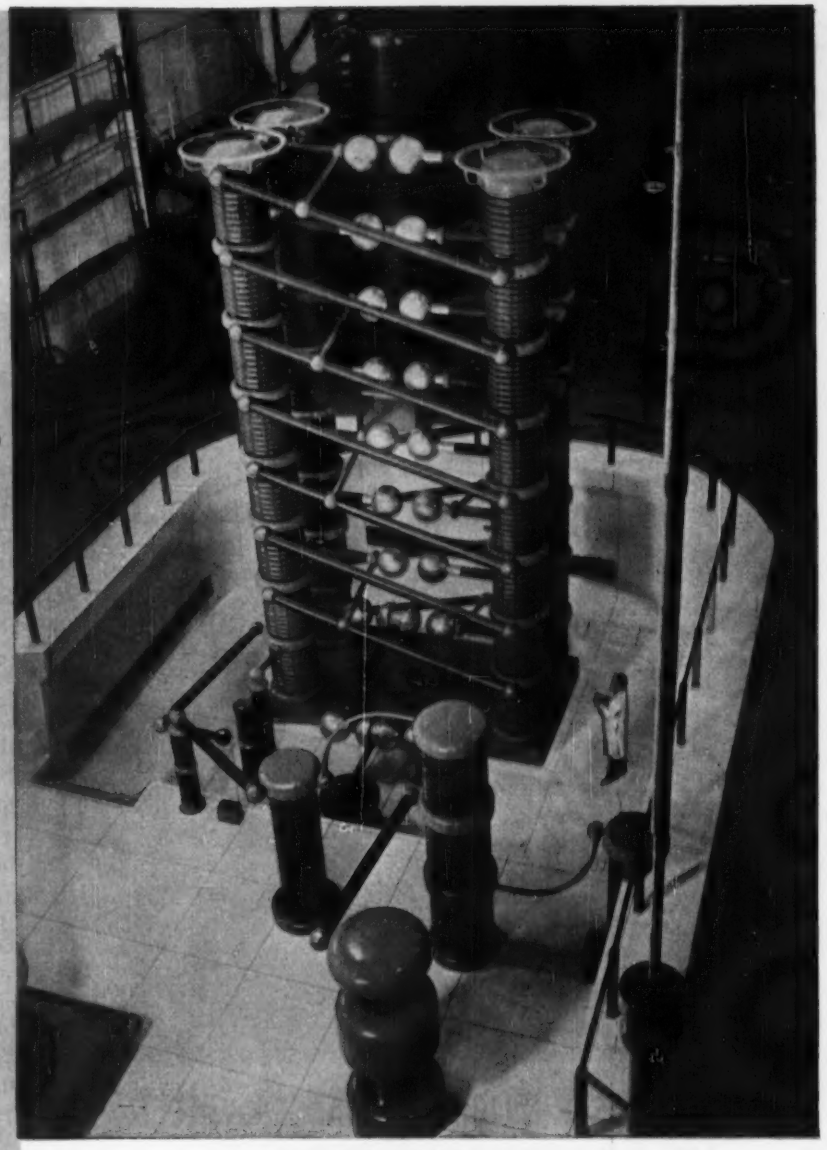
Please send me complete information on G-E cables now made with GE No. 1799 DG varnished Dacron glass insulation.

Name _____ Title _____

Address _____

Company _____

City _____ Zone _____ State _____



Transformer Capacity of over 5,000,000 kVA per annum

The Ferranti transformer plant at Hollinwood, Lancashire, England, covering an area of over 300,000 sq. ft., has a manufacturing capacity per annum of over 5,000,000 kVA of Large Power Transformers, Distribution Transformers, Voltage Regulators, High Voltage A.C., D.C., and Impulse Testing Plant and Specialised Equipment. Contracts include the supply of transformers for the Garrison Dam and McNary Dam Projects in the U.S.A. and the Alcan Project in Canada.

National Physical Laboratory

This Ferranti Impulse Generator at the National Physical Laboratory, Teddington, England, by whose permission the photograph is reproduced, generates 3,200,000 volts and has an energy rating of 77 kW seconds. This is a typical example of the type of A.C. and D.C. equipment manufactured by Ferranti Ltd., for routine and research testing.

FERRANTI LTD *Head Office and Plant:* HOLLINWOOD · LANCASHIRE · ENGLAND

OFFICES AND PLANTS

FT 160/2

NEW YORK: Ferranti Electric Inc., 30 Rockefeller Plaza, N.Y. 20
TORONTO & ST. CATHARINES: Ferranti-Packard Electric Ltd., Ontario, Canada
LONDON, ENGLAND: Kern House, 36 Kingsway W.C. 2.
MANCHESTER, ENGLAND: Ferranti Ltd., Moston, Manchester 10
EDINBURGH, SCOTLAND: Ferranti Ltd., Ferry Road, Edinburgh 5

Alarm Panel . . .

(*Continued from page* 137)

depressing the "quiet" button and then manually rotating the appropriate set point dial until the numbered light flashes on.
Fischer & Porter Co, 303 Jacksonville Rd, Hatboro, Pa.

Pin Insulator . . .

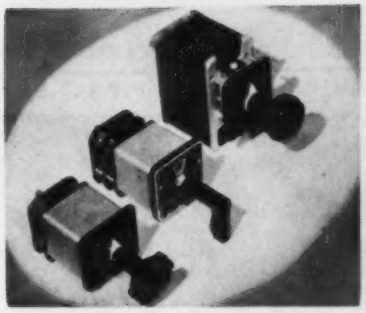
. . . was designed primarily for 20/34.5-kv applications. The one-piece insulators have smooth, non-abrasive, self-cleaning surfaces, high-compression brown glaze, light weight and high cantilever strength. It is designated No. NP23D.
Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

Photoelectric Control . . .

. . . measures only 3 in. in diameter. The tubeless T 8000 control uses a full wave rectifier for direct operation of the 1,000-w relay from the cadmium sulphide photocell. A pin and jack assembly permits easy field replacement.
Tabet Mfg Co, Inc, Norfolk 12, Va.

Control Switch . . .

. . . is compactly designed for switchboard applications where space is at a premium. Designated the SBM, the switch has two mechanically and



electrically independent contacts per stage. Each contact has a double-surface cam giving positive opening and closing. Rated for a mechanical life of 500,000 operations, the SBM's electrical ratings are 300 v ac or dc, 20 amp continuous.
General Electric Co, Schenectady 5, N. Y.

Charge Control . . .

. . . eliminates danger of over charging the battery. The MP-3 Exide Charge Control unit is designed to control both regular daily charges and weekly equalizing charges, and it requires no attendance or resetting. Models may be selected for charging specific-sized batteries ranging from 6 to 60 cells.
Exide Industrial Div, Electric Storage Battery Co, Rising Sun and Adams Aves, Philadelphia 20, Pa.

More New Products

Moisture inhibitor eliminates wicking and reduces failures. Known as CRC, it is non-conducting but does not interfere with conductivity of contacts or commutators.—Corrosion Reaction Consultants, Inc, 116 Chestnut St, Philadelphia 6, Pa.

Probe combines yaw and pitch insensitive total temperature and total pressure thermocouple in the same unit. Standard sizes are ⅛, ¼ and ⅜ in. stem diameters. — United Sensor & Control Corp, Glastonbury, Conn.

Cord reel has four outlets for multiple uses. The Model No. 910 portable reel has a cord capacity of up to 375 ft.—Daniel Woodhead Co, 15 N Jefferson St, Chicago 6, Ill.

CUT INSTALLATION and SERVICE COSTS on rural entrances . . .

HI-LINER

pole-top metering and circuit breaker cabinets

- *one complete package— 200 amp. service and more!*
- *no meter-loop needed!*
- *heavy duty industrial-type circuit breakers— ground level disconnect!*

Cut installation and service costs on entrances of 200 amps. or more—eliminate costly, power consuming meter-loops with HI-LINER! Head and shoulders above the usual pole-top metering installation, the Hi-Liner combines an overhead mounted current transformer with ground controlled line switches in rain-tight steel cabinet. Installation is fast . . . all you need is one 4-conductor #12 cable and ½" conduit running down the pole to the meter. No more heavy wire loop, weatherhead, large diameter conduit —and you'll eliminate the entire voltage drop of the meter loop! Now your customer can disconnect his entire system for emergencies or repairs—and you'll eliminate countless service calls on disconnects and local failures.

NEW! Two-way split entrance breaker—provides all the advantages of the Hi-Liner plus a split of the 200 amp service into two 100 amp. lines. Breakers may be ground controlled either individually or simultaneously.

NEW! Underground secondary—contains a 200 amp. meter socket, 200 amp. circuit breakers with overcurrent protection, secondary wiring trough and terminal strip in one compact, pre-wired package!

WRITE TODAY—for detailed specifications on single phase, three phase, split-breaker, and other Hi-Liner units.

HI PRODUCTS, INC.
7722 Wentworth Ave., So.
Minneapolis, Minn.

A subsidiary of GENERAL ELECTRONIC CONTROL, INC.

Bus parked near outlet . . .

is pre-heated by electric heater, and . . .

School Children Get Warm Ride to School

School buses of the East China Township School District on the Detroit Edison Co system are warm when boarded by the school children and the driver. Electric heaters controlled by an electric timer do the trick.

While the buses are parked, the heaters are plugged into outlets which have been installed near the parking area. At the same time, the timers are set to turn the heaters on about two hours before the bus is due to go out on its rounds.

As a result of the pre-heating, bus windows are free of ice and snow when the driver arrives.

Economics of the pre-warming heaters have been endorsed by the school board. The convenience, comfort and safety of electric heaters has pleased drivers, school children and parents.

The idea of pre-heated school buses was sold to the school board by Irv Teichman of Detroit Edison's Port Huron office.

Give Better Electrically Ad to Appear Nov 21

The electrical industry's second Christmas gift promotion will be a multi-page "Give Better Electrically" advertacular in the November 21st issue of *Saturday Evening Post*. Products of twenty electrical manufacturers will be featured in a Dutch-door section. Top-half of the ad will invite the public to "Give Better Electrically."

Coordinated nationally by the Live Better Electrically Project and Edison Electric Institute, the merchandising program is designed to spark gift promotions by electric utilities, distributors and retailers. Over 100 utilities sponsored local GBE campaigns last year.

This year, EEI will feature the GBE theme on its network TV shows, in trade press advertising, and with a complete merchandising effort.

Point-of-purchase materials provided by EEI for local campaigns will include a flasher-light, three-dimensional, tree display; a large-size banner; miniature easel-backed cardboard Santas; and repro art of the Post ad's top illustration.

Speaking for EEI, Ralph Zeuthen, program manager of the Live Better Electrically project said, "Every waking day, except for three hours the public is exposed to an advertising message. We must now have better creative work, better media buying, better media planning, better packaging of advertising and longer life for it. There is competition for the reader's attention, and we must package advertising so we can use it beyond the life of the magazine."

Robert Boian, manager of the LBE program for General Electric Co, said their program ran four years and cost $9 million. EEI has now assumed both title and promotional leadership. Boian noted that he hoped the LBE project next year would include portable appliances, a $1.5 billion market.

Illinois Tradesmen Get Electric Heating Story

The Illinois Power Co has informed the electrical and home building tradesmen in its service area of the benefits of electric heat.

"The dream stage of electric heating is past," said H. K. Williams, service area manager of Illinois Power. Though electric heating is not yet in the price range of every

(*Continued on page* 144)

"Quality *and* quantity is a combination that's essential to a true pipe collector", says this connoisseur. It's equally desirable for industrial wood users, too. That's why so many of them consistently specify AMCRECO pressure treated products. Take quality. Service records of installations going back several decades show that AMCRECO pressure treatment provides the longest lasting, most dependable wood protection. Quantity? We maintain sizable stocks of treated material at 13 strategically located plants. This assures you delivery of well seasoned treated poles, posts, ties and other timber – whatever the emergency or size of your order.

AMERICAN CREOSOTING CORPORATION AMCRECO Louisville 2, Kentucky

Subsidiary of Union Bag-Camp Paper Corporation

homeowner, Williams pointed out that it is often compared to conveniences in modern cars such as automatic transmission, power steering and power brakes. These items cost more but the consumer feels the convenience is worth the price.

Figures compiled by Illinois Power show the cost of electric heating per year ranging from $11.75 less to $136.30 more than other types of heating, depending on the type. These figures include average installation and operating costs.

Iodine Helps Bulbs Burn

Incandescent light bulbs can burn brighter if some iodine is put in them, according to two lighting engineers. E. G. Zubler and F. A. Mosby, General Electric Co, developers of an experimental iodine-treated bulb said that the iodine prevents the glass sides of the lamp from darkening after burning for some time.

SELLING BRIEFS

General Electric Co's Morgan Christensen, Large Lamp Department, has been awarded the *Industrial Market Marketing* magazine's "Sales Promotion Idea of the Month." Award was for the See-Level Comparator (EW, June 22, 1959, p 125). Company reports they have sold over 150 units.

Public Service Electric & Gas Co held its Third Annual Electric Heating Show, Sept 29, 30 and Oct 1. Show emphasized use of electricity for residential auxiliary and supplemental heating for bathrooms, hard-to-heat rooms, enclosed porches, garages, basements and house additions. One purpose of exhibit: To help develop a mutual relationship between manufacturers, distributors, and electrical contractors.

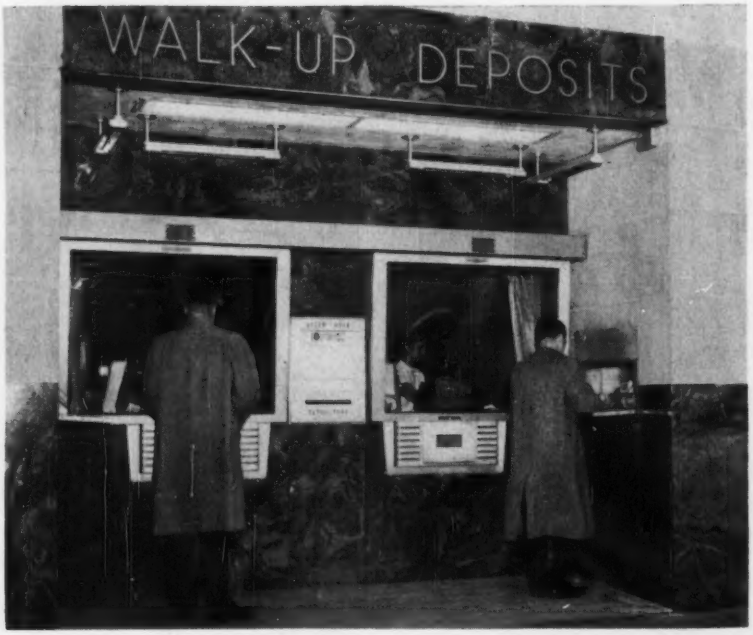
Florida Power & Light Co is pushing Radio-TV-Hi-Fi in September and October through window displays and sales aids to dealers.

Pennsylvania Power & Light Co is telling manufacturers and distributors that eight out of every nine families in their area do not have an electric dryer. "Step Up to Washday Freedom" campaign will run through October. Salesmen will get a 15-lb turkey, 2 lbs of fresh cranberries, and a recipe sheet of cranberry recipes for every two electric dryers they sell. Unusual promotion aids include vehicle bumper signs, and match books.

Air conditioners that don't look like air conditioners have been designed by Lippincott & Margulies, Inc, New York. Units act as room-dividers, table models, or simple free-standing "objets d'art." All can be used to heat or cool.

Radiant Heat Solves Bank's Pen and Ink Problem

Part of the Peoples-Merchants Trust Co's "drive-through" operation is a "walk-up" window area. Executives of the Canton, Ohio bank feel the use of these windows has been very good for business.



But a problem arose in cold weather. The ink in the pens congealed to an extent that they were practically useless.

Ohio Power Co contacted bank officials and suggested a radiant heat application for this area, feeling that this might rectify the pen situation. It would also keep the customer warm while attending to his banking needs, especially in extreme weather, and would lend itself nicely to advertising and promotion schemes for the bank.

After the go-ahead from the bank, four 1,100-w Chromalox radiant heaters were installed. They are controlled by a manual switch and an outdoor thermostat set at 40F. With this control system, the heaters will operate only when the drive-through bank is open for business and the temperature is below 40F.

"Have you installed heat in the drawers?" and "It must be hotter than the dickens in the bank because I can feel the heat clear out here," have been customer comments.

Melvin C. Edgar of Ohio Power supervised the installation.

What do you Need?...

...a Single-Vented Cutout...

Here is a cutout to meet the needs of your present system and that will continue to protect your system of tomorrow. The Chance "F2" is available in 5.2, 7.8, 15 and 27 KV, and in 100 and 200 amp. ratings, with interrupting capacities as high as 12,000 amps.

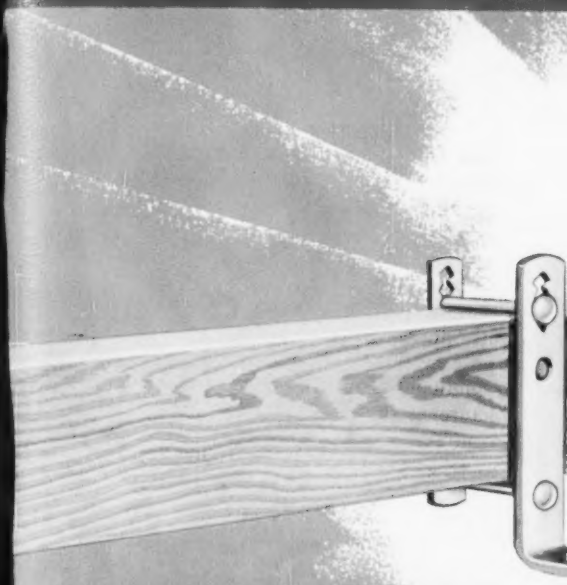
Advanced engineering features of the "F2" include: A positive latch, to prevent the cutout from coming open under vibration or shock . . . versatile, parallel-groove type terminals that give positive high-conductivity connections . . . and anti-corrosive bronze sleet hoods to completely protect the vital contact areas.

You get wide range operation with any universal fuse link

The fusetubes used in the 100-ampere "F2" all have the same bore diameter—irrespective of the interrupting rating of the cutout. You need buy only one for each voltage rating, and you can use any manufacturer's universal fuselink. The "F2" cutout will interrupt any fault within its rating with a low-cost, expendable fuselink.

...for Low Fault Interruptions?...

What do you



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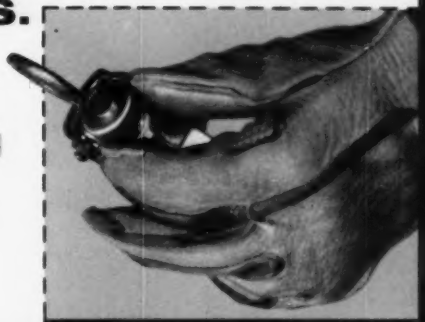
...ou Need?...

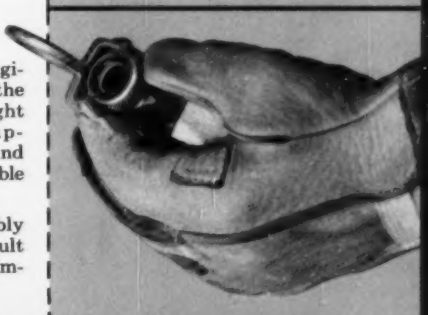
...a Double-Vented Cutout for High Fault Interruptions?

YOU GET BOTH

with the CHANCE "F2"
...Complete protection from High, Low or Medium Fault Currents.



Expendable Cap, Small Bore and Link Ejector guarantee interruption of ANY short circuit.

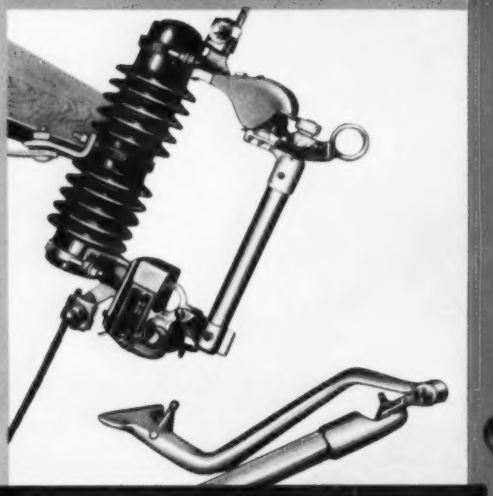


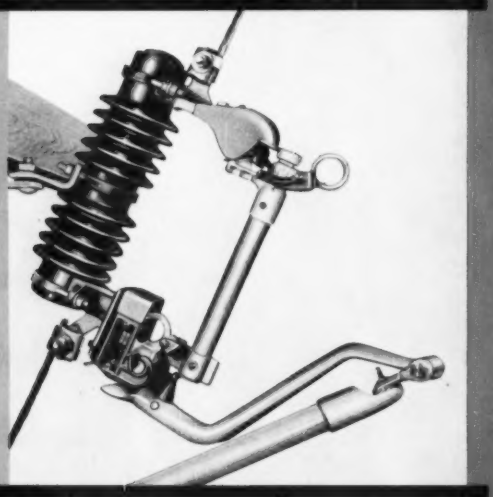
By using an expendable cap, the Chance "F2" Cutout gives you single venting on low faults, double venting on high faults for wide-range operation on low, medium or high fault currents. This gives you all the advantages of both single-venting and double-venting without the disadvantages of high fault stress on single-vented cutouts or the difficulties of low fault interruption with double-vented cutouts.

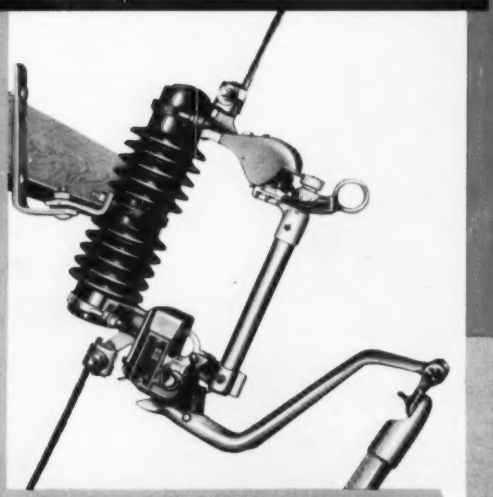
The top of the expendable cap, which seats against the fuse-link buttonhead, is frangible, and tears out when pressure inside the fusetube approaches a value that might burst the tube. The expendable-cap-equipped "F2" single vents during low and medium fault-current interruptions—double vents during a high fault interruption.

A mechanical link ejector makes doubly sure that the "F2" operates on low fault currents. This link ejector is vitally important to load break operation.

Breaks Load, too . . . with Link Break Tool (SEE REVERSE SIDE)







NEW... Link Break Tool...

makes any Chance F or F2 Cutout a Loadbreak Cutout!

The Chance Link-Break Tool acts as a portable load break lever. With this tool, any "F2" Cutout you install can play the dual role of standard and loadbreak cutout. You can reduce inventories—cut initial costs—eliminate conversion costs.

It is simple in design—linemen find it easy to use. The silicon-bronze fingerlike projection is easily hooked over the link ejector of the cutout; and a downward pull on the tool breaks the fuselink and the load—just like a conventional loadbreak cutout. The tool is used with standard universal poles.

A. B. CHANCE COMPANY
CENTRALIA, MISSOURI
A. B. Chance Co. of Canada, Ltd., Toronto

ABC

SPECIAL INTRODUCTORY OFFER!

To prove the unusual advantages of this link-break tool, the A. B. Chance Company will include a FREE tool with every order of 100 or more "F2" Cutouts. This offer is limited—it expires October 31, 1959. Attach this certificate to your order.

CKB9-11

A. B. CHANCE CO., Centralia, Missouri

This certificate entitles the purchaser to _____*FREE Link Break Tools when accompanied by a purchase order for 100 or more Chance F2 Cutouts.

*One FREE Link Break Tool for every 100 F2 Cutouts purchased.

Ship to:

Name_____

Company_____

Address_____

City_____ State_____

Purchaser's Order No._____

OFFER EXPIRES OCTOBER 31, 1959

Public Relations

Want more attention from the papers? Here's . . .

How to Buck Up Press Relations

"You are going to hear a few harsh criticisms, but I want to impress upon you the fact that we do not believe you are doing a poor job. We want to help you do a better one." With these words, J. Louis Donnelly, Associate Financial Editor of the *Journal of Commerce,* kicked off a panel discussion on the electric utilities' press relations at last month's PIP Workshop Conference in Philadelphia. He was addressing a group of utility public relations men who had been called together by the advertising-PR firm of Bozell & Jacobs, Inc., which handles the electric utilities' Public Information Program.

Donnelly's words were an accurate description of what was to follow. The panel was composed of newsmen representing the printed media. Besides Donnelly, it included A. N. Wecksler, Washington bureau chief for Conover Mast Publications; Gene Smith, *New York Times* utility writer; Paul Beatty, general manager of the Record Advertising Co, which publishes two weekly newspapers in southern Virginia; and H. R. Frankel, managing news editor of Electrical World. They took off their gloves and provided much constructive criticism and some down-to-earth tips for utilities in their dealings with the press.

Donnelly had two points to make himself. His first was a criticism of "the interference of lawyers" with the flow of financial news—a condition he described as "SEC-itis." Said Donnelly: "With very few exceptions this group of men finds that the easiest thing to do is say 'No.' . . . They censor releases and do not permit company presidents to comment on financing moves which have already been approved or fully discussed by boards of directors.

"Do not forget that directorates are composed of a dozen or more individuals who may talk to friends and associates—not to peddle information, but perhaps to obtain advice in regard to these pending actions. Sooner or later large security holders get the information in advance of the rank and file stockholders.

Tips to Help Your Relations with the Daily Press . . .

1. Learn the newspapers' deadlines. Nothing is worse than getting news a day late.
2. Know what different newspapers want: The big dailies are not interested in the same kind of story as the local press.
3. Don't overlook local color stories. They often have universal interest.
4. Be sure you know who covers utilities for the various publications. A return-addressed post card will get the names for you.
5. Always send two copies of everything: One to the reporter who covers utilities, and one to the financial editor.
6. Send copies of your house organ to the newspapers. It often contains story ideas.
7. Put everything in your earnings report. Include percentages, year-to-year comparisons, and explain unusual results.
8. Don't give advance "exclusives" on earnings statements and similar periodic reports.

How they act on that information is reflected in the price of the stock."

His second point was that more official recognition should be given PR men. "It is important that you participate in management planning," he said, "as you and your aides understand the importance and urgency of news. It will help you, and it will help the company."

W. H. Wecksler spoke as a Washington reporter and bureau chief, whose specialty was not the utility industry. He told the PR men: "The specialists do not need your guiding hand as much as the general reporters." He called for the private utilities to supply more "background and knowledge" to newsmen "before the fat is in the fire. . . . It is my feeling that if you could educate a cadre of active news media men . . . in every community including, of course, Washington, when a problem arises you will get intelligent and informed coverage . . . You must sell them in advance, give them some interest, reach them, and then when your story comes to the fore, you'll get intelligent coverage."

Too often, reporters are "not approached by spokesmen for the utility companies with offers of help . . . I have found that your spokesmen are ready and willing to help when asked, but they have not necessarily sought me out . . . If the media are to be aware of the position of the private electric companies, it shouldn't be an overnight affair, just after the lightning strikes."

Gene Smith offered some basic tips for getting along with the newspapers, from the utility specialist's point of view. These tips appear in the box at the top of the page. Smith told the PR men: "You perform a most valuable service—or, you could. You are really our leg men,—or, you should be. That's the rub. How well do you really succeed? Think it over honestly." These fundamental rules are simple, but failure to observe them hurts utilities' press relations with the large dailies. "I think it's worth trying to get your company in the big dailies so that stockholders all over the nation know about you. No company is too small for us to be interested in if you really have a story to tell."

Representing the small newspaper, Paul Beatty showed more concern for local issues than for press relations as such. While he pointed out that a utility can do itself and the entire community a great deal of good through activities such

as area development, he noted that rates which seem too high, operation that smacks of inefficiency, and unsympathetic tree trimming can hurt a utility's relationship with the community and with the paper that serves it. Beatty also seconded a remark that had been made previously by Wecksler to the effect that "If the top brass in your industry would get over being press-shy, we would all have an easier time of it."

H. R. Frankel characterized the business press as a "virgin field" for most utility PR men. He pointed out that many of Smith's suggestions applied equally well to industry magazines, but he had a few specialized tips to add to the list. They appear in the box below. The first five of them are specific and self-explanatory. The last one, however, is more general and requires further explanation. Frankel provided it for the gathering as follows:

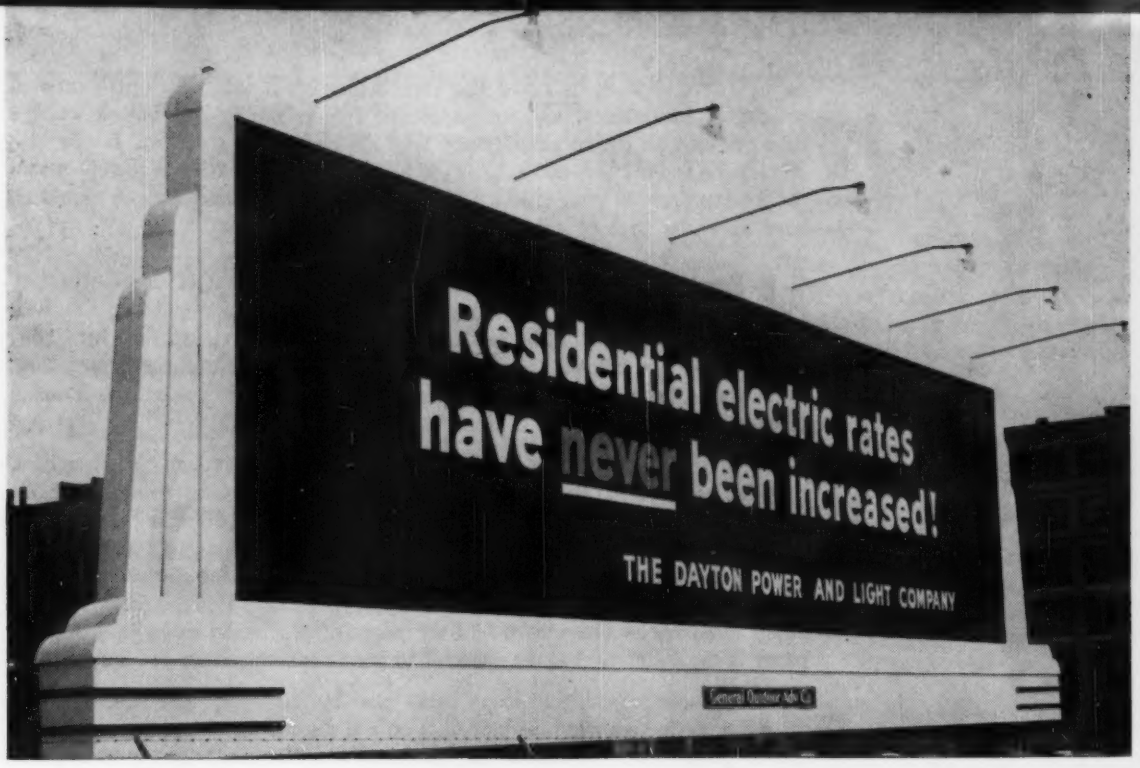
"I would like to see this privately-owned electric utility industry of ours have an articulate national spokesman—a man who knows the utility industry inside and out, and can speak for it immediately from a national sounding board without having to check with every utility executive from Maine to southern California." He went on to point out a recent case where a false interpretation of the facts had served as the basis for major political speech directed against power companies. The speech "hit the pages of practically every major newspaper in the country," but the speech had gone unanswered for two months.

"It went unchallenged, and is probably now buried—deep and obscurely—in the public collective mind, to be called up again sometime when our opponents find it useful," Frankel said. When the reply was delivered, "two months late," it was given before an audience of people who already knew the facts, and could recognize their misinterpretation immediately. "We call this 'talking to ourselves'," said Frankel, "and we see far too much of it."

"We'd like to see your case—and it's a good one—stated loudly and clearly by an effective industry figure—a man who has the facts, who knows how to get them before the public, and who can act or react to charges against us immediately without being hamstrung by either timid executives or non-committal committees—a man to whom controversy is not a dirty word. Find him; get him to work for you by giving him a free hand, and you will see your viewpoint in the nation's press more often than you do now."

. . . and Ideas to Help You Use Industry Magazines

1. Remember that magazines close a week or two ahead of the daily newspapers. If possible, send them the story in advance, on a "hold-for-release" basis.
2. Know what stories the trade magazines want.
3. Give the business press more details in your releases to them. Technical information which would not be used in a general newspaper story is often a necessity for an article in a trade magazine.
4. Persuade people in your company to write by-lined articles about interesting developments. Make your talents and facilities available to help with these articles.
5. Send leads to the editors if there is not time to work up a complete story. The magazine may want to assign a reporter or field editor to cover it. If the lead doesn't produce a story right away, it will be at hand for future use.
6. The electric utility industry badly needs an articulate national spokesman.



Dayton P&L Co Sets the Record Straight

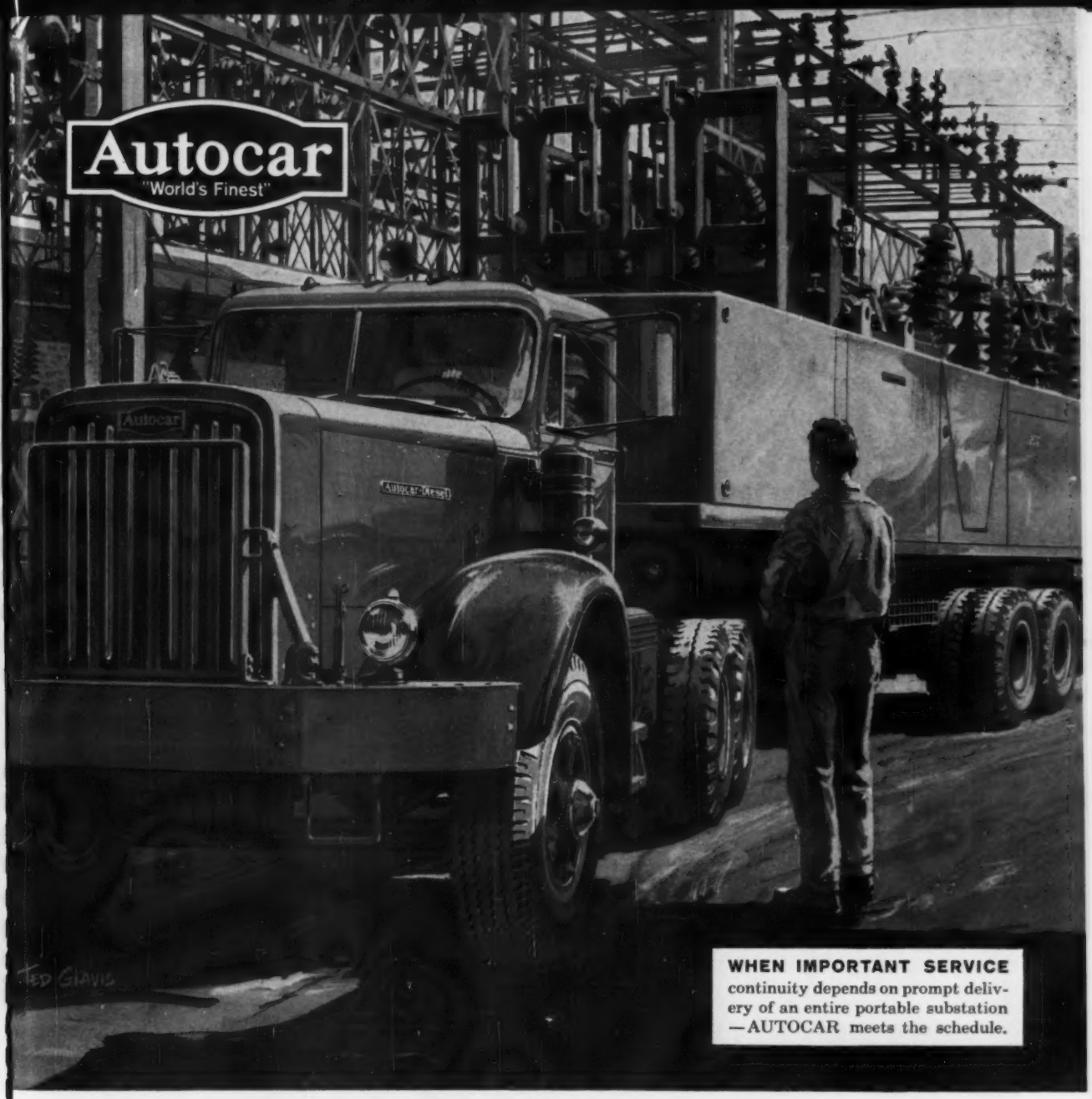
Dayton Power & Light Co is correcting an erroneous impression that was formerly held by almost all of its customers. The billboard above shows the company's direct approach to setting the record straight. By spreading the word through newspaper advertising, press releases, local television commercials and displays, DP&L hopes to convince Dayton home-owners that "Residential electric rates have never been increased!"

The campaign all started early this year, when a survey showed that DP&L customers thought that the residential rate had been rising. Fred H. Dettmar, manager of the company's Public Relations Division, explains: "For three years The Dayton Power and Light Co has been making substantial samples of public opinion and doing relatively well on questions concerning electric rates. We have told the "Penny Story," the "Value Story," and every other publicity and advertising stunt that we could think of to prove electricity is a good buy.

"Still there remained a sizable group of non-believers, Why? Early this year we made a simple, little additional sampling of our own . . . We asked: 'Have your electric rates increased? If so, how much?' "

Answer showed that all respondents thought rates had gone up, and the estimated amounts averaged out to about 20%. On the theory that this misconception might explain the hard core of critics that showed up in public opinion surveys, DPL decided to try the direct approach, and began to stress the simple fact, that residential electric rates have never gone up at all in Dayton.

"Initial reaction proved our point," says Dettmar. "People said they did not believe the statement. So then we led them into a discussion of greater usage, additional appliances, etc. The real test," Dettmar continues, "will be the next public opinion survey. Maybe our faces will be red. That's part of the advertising hazard."



WHEN IMPORTANT SERVICE continuity depends on prompt delivery of an entire portable substation —AUTOCAR meets the schedule.

"Takes Autocar to get this load where it's needed"

A whale of a load—a whole mobile substation! One that would make an ordinary truck call it quits. But, for custom-engineered Autocars, it's all in a day's work.

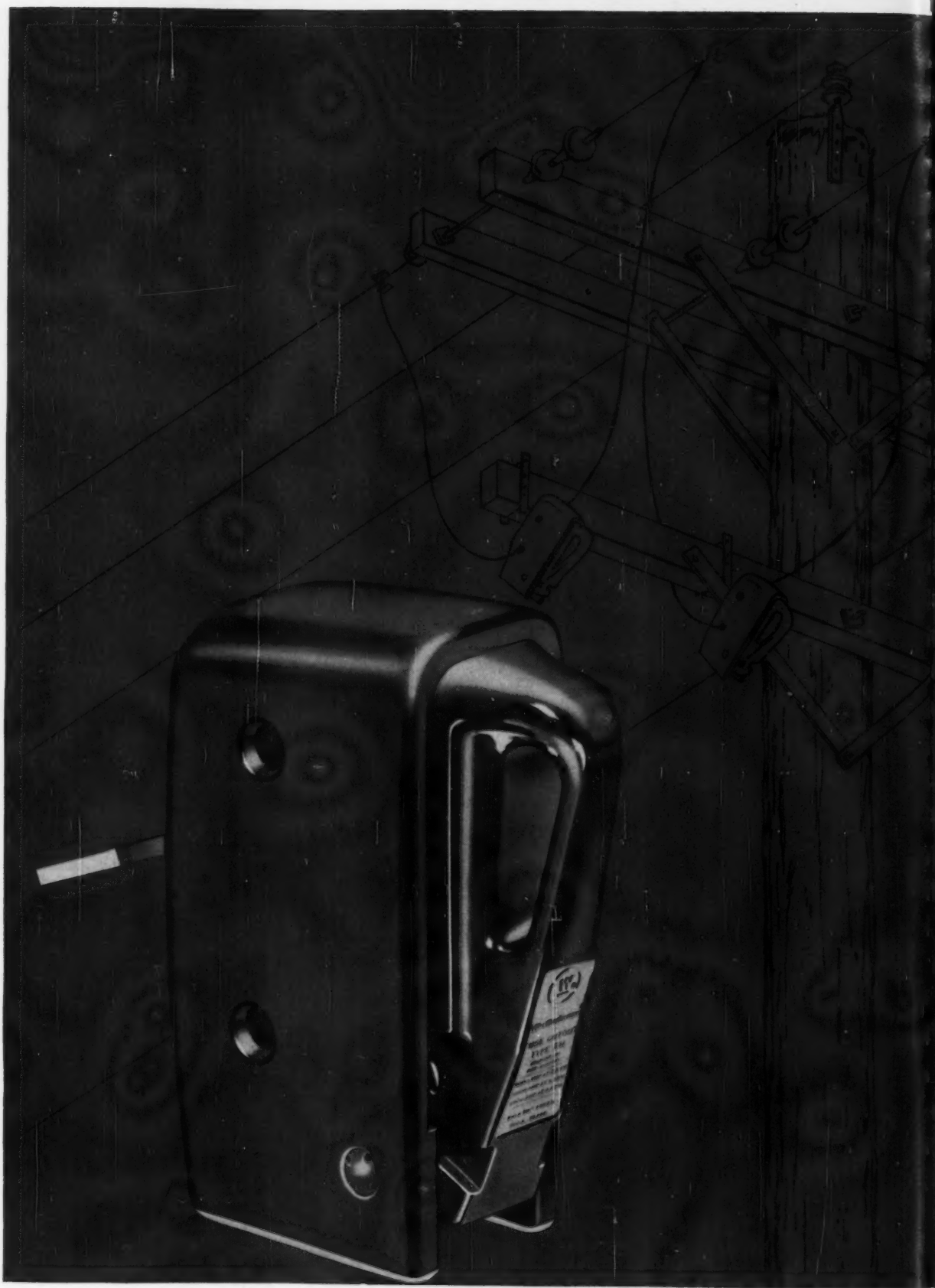
Over long stretches of open road or through rugged off-highway conditions, Autocar proves every day that it can handle extra-size payloads—like giant transformers and construction equipment—with ease—and get them where they're needed, when they're needed—*fast, sure* and *economically.*

Every Autocar is custom-engineered—"tailored"—to specific operating conditions. *Every* component is designed to form an integrated, balanced unit . . . providing unequaled strength, ruggedness and staying power that make any job cost less.

Why settle for less than the "world's finest" on *your* hauling jobs?

Autocar
"World's Finest"

Division of
The White Motor Company
Exton, Pa.



Now, from Westinghouse . . .

ONE CUTOUT FOR ALL SYSTEM REQUIREMENTS

Here is a truly universal fuse cutout! The Westinghouse EU cutout spans a complete range of ratings to meet any system requirement. You need stock only one type of unit, saving you 10 percent or better per year on cutout inventory costs alone.

Only the Westinghouse universal cutout gives you . . .

- A single unit designed for application on single-phase systems up to 7.8 kv and three-phase multi-grounded wye systems up to 13.8 kv.
- A single 100-amp rating with growth capacity for tomorrow's distribution systems.
- The highest interrupting capacity available—14,000 amps at 2.8 kv, 10,000 amps at 5.2 kv, 6000 amps at 7.8 kv—all in one enclosed cutout.

Let us prove how Westinghouse EU cutouts can save you real inventory dollars while meeting every requirement on your system. Call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. J-60986

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS"
CBS TV FRIDAYS

Capwell Elected President of A&FP Affiliate

George L. Capwell has been elected president of Empresa Electrica del Ecuador, S.A., affiliate of American & Foreign Power Co Inc. He will retain his position as general manager of the utility. He succeeds Myron G. Reed who was named chairman of the board of directors.

Capwell has been with Empresa Electrica since 1927, with the exception of eight years as vice president of A&FP's Panama affiliate.

He was with A&FP's Cuban affiliate from 1925 until 1927 when he transferred to Ecuador as plant superintendent. In 1937, he was promoted from general superintendent to general manager and held that post until 1946 when he went to Panama. He returned to Empresa Electrica del Ecuador as vice president and general manager in 1954.

Connor Appointed Sylvania VP

George C. Connor has been appointed regional vice president of Sylvania Electric Products Inc with responsibility for the direction of the company's marketing activities in the East.

Connor has been vice president-photolamp sales of Sylvania's Lighting Products Division since February, 1958. Before that he served as general sales manager, photolamps for seven years.

Connor's principal responsibility in the newly created position will be the coordination of the marketing activities of Sylvania's various divisions in the area. He will aiso administer Sylvania's Eastern distribution centers where regional sales, service and warehousing operations are centered.

He has also been affiliated with Radio Corp of America, Brunswick-Balke-Collender Co, and Electronic Radio Corp.

PERSONAL BRIEFS

C. D. Sayre has been promoted to public relations director at Consumers Public Power District.

Robert L. Lewis has been named administrative assistant to the personnel director of Arkansas Power & Light Co.

Vincent J. Hayes has been promoted to assistant chief engineer of Connecticut Light and Power Co. **John M. Schamberger** succeeds him as electrical engineer.

R. K. Hunter becomes commercial supervisor of the Mississippi Power Co's Meridian division. **J. P. Stephens** has been appointed administrative assistant to the president; **H. H. Bell,** administrative assistant to the Gulfport division manager; **H. P. Brown,** division engineer of the Laurel division; **J. E. Kizzire,** supervisor of land and construction; and **C. F. Stanford,** supervisor of transmission.

D. H. Heavenor has been transferred to the Vanderhoof district of British Columbia Power Commission as manager. **R. A. Switzer** has been named manager at Fort St. James. **Max Munro** has been appointed district manager at Burns Lake.

Joseph A. Pelletier has been named manager of electrical engineering, and **Earl L. Mann,** manager of gas engineering at Northern Indiana Public Service Co. **Martin J. McCullough** has been appointed assistant manager of industrial relations.

Quentin F. Stultz II has joined the public relations staff of Indiana & Michigan Electric Co. He was previously news editor of **Electric Light & Power** magazine.

A new Power Reactor Development Co standing committee has been formed to make recommendations to management on personnel and operating matters. **R. P. Liversidge,** Philadelphia Electric Co, is chairman. **A. J. Mayotte,** PRDC, is secretary. Other operating committee members are: **E. E. Althouse,**

(*Continued on p* 159)

why Cavalier is YOUR BEST SOURCE FOR ELECTRIC HEAT

CAVALIER electric heat has real **quality.** It's easy to sell, pleases customers and eliminates costly service calls. (People are sick and tired of shoddy merchandise.)

CAVALIER has a complete line of electric heaters, all QUALITY GUARANTEED by a financially sound firm since 1865 for its policy of making quality products and pricing them fairly **at all times.**

CAVALIER equipment is soundly built. Each unit is individually energized and high potted with 1,000 volts. Although repair parts are rarely needed, they are promptly available at reasonable cost.

CAVALIER is active in NEMA and other organizations devoted to the advancement of the electrical industry, keeps to efficient trade channels and works to assure a business-like profit for the distributor and the contractor.

CAVALIER is your assurance of Highest Quality products with complete sales and merchandising helps, plus regular advertising in leading shelter publications.

Personnel and equipment of the specialized research, engineering and testing facilities for Cavalier electric heat are outstanding. Cavalier was one of the first quantity manufacturers of electric heat and has always built to Highest Quality Standards.

Cavalier has a complete line with quality features combined in no other line. **Automatic Electric Baseboard** — fully enclosed element with continuous vertical fin. Easiest cleaning of any baseboard on the market. Approximately 200 watts per lineal foot yet maintains low 125° surface temperature. Thermostatic control sections or wall mounted thermostat. 115 volt convenience outlet sections. Built in raceways for wire.

Send for catalog showing full line — Baseboard, Wall Insert, Portable, Bathroom, Floor Furnace, Cable Heat.

FIRST ▷

- *in quality construction*
- *in engineering advances*
- *in safety*
- *in sales making features*

HEAT BETTER ELECTRICALLY

ELECTRIC HEATING DIVISION

CAVALIER CORPORATION, Chattanooga 2, Tenn.

Over 90 Years of Quality Products

YOU CAN GIVE BETTER SERVICE CONTINUITY WITH

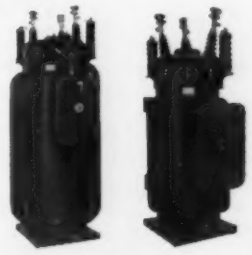
SAFER

WESTINGHOUSE 1¼%-STEP REGULATORS

Do you always know . . . for sure . . . the position of the tap changers in your regulators? You can, with the Westinghouse position indicator which gears down from a higher speed cable drive. This eliminates drive cable error, prevents danger of bypassing off-neutral position. Dial can easily be read from the ground.

In addition, where load range selection is used, internal indicator detents prevent movement of limit switches from set position to provide positive range limits.

Here is more evidence that Westinghouse feeder voltage regulators are safer to operate, assurance that you can offer better service . . . all the time. J-70901



Westinghouse URF and URL single-phase feeder voltage regulators

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

During processing, Anaconda Butyl passes through screens similar to this one—screens fine enough to hold water—fine enough to trap any undispersed particle which might cause future insulation trouble in high-voltage cable.

HOW AN ANACONDA PROCESS HELPS SCREEN OUT SERVICE FAILURE IN HIGH-VOLTAGE CABLE

Even butyl—the most effective rubber insulating material ever developed for high-voltage cable—requires additives to bring out all its superb insulating properties. These additives are usually in the form of finely divided powders which are extremely difficult to disperse uniformly in the raw butyl.

And actual service proves poor dispersion can drastically shorten high-voltage cable life.

That's why Anaconda developed an entirely new mixing process. And why Anaconda built screens (like the one you see above) into the production line to catch every oversized undispersed particle. These screens are so fine, they will actually hold water.

Yet tons of butyl insulating compound are squeezed through before the screens need cleaning—a tribute to the new mixing process. And—to the rigorous quality control which dominates every specialized step in the manufacture of Anaconda Butyl (AB) Cable.

This highly specialized quality control is probably the biggest single reason why Anaconda Butyl (AB) Cable gives such long trouble-free life. Why you should consider it the next time you buy high-voltage cable. Send for Publication DM 5903: High-Voltage Durasheath* Cable to Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

*Reg. U.S. Pat. Off. 59258

ASK THE MAN FROM

ANACONDA®

ABOUT BUTYL (AB) HIGH-VOLTAGE CABLE

Corp, Central Hudson Gas & Electric; **L. W. Cadwallader,** Potomac Electric Power; **Paul Gravelle,** Toledo Edison; **R. M. Hetherington,** Iowa-Illinois Gas & Electric; **A. T. Jorgensen,** Long Island Lighting; **J. A. Keene,** Alabama Power; **L. B. Locklin,** Georgia Power; **M. E. Lucky,** Mississippi Power; **J. L. McNealey,** Columbus & Southern Ohio Electric; **W. A. Pollock,** Wisconsin Electric Power; **W. M. Reast,** Gulf Power; **R. M. VanDuzer,** Detroit Edison; **H. R. Wall,** Consumers Power; **Leon White,** Rochester Gas & Electric; and **B. J. Yeager,** Cincinnati Gas & Electric.

Wisconsin Electric Power Co has made changes in its sales organization: **G. R. Black** has been appointed assistant sales manager; **J. H. Dunham,** assistant sales manager, has been given additional and new duties; and **F. F. McCoy** has been named assistant to the general sales manager.

Otter Tail Power Co has made the following organizational appointments: **Dean Jacobson** has been appointed manager of the meter department. **W. A. Halvorson** has become division manager East, supervising the company's Minnesota properties, the Wahpeton District and all South Dakota properties except that part within the Oakes District. Succeeding him as North Dakota division manager is **R. W. Nygard. J. J. Seashore** has become Fergus Falls, Minn., district manager and **L. Q. Perkins** goes to Devils Lake in a similar capacity. **K. H. Berquist** has been made manager at Garrison; **Ralph B. Lyon,** manager at Milbank; **Trevor Reese,** district manager at Morris; and **L. M. Engen,** district manager at Langdon. **P. J. Brewer** has become manager at Crookston, replacing **C. M. Carlson,** retired.

R. E. L. Shirley has been named assistant to the vice president and general manager of Georgia Power Co. **W. F. Poole** replaces Shirley as field supervisor of distribution for the company.

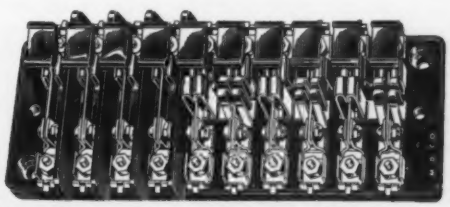
James E. Dobson has been appointed manager, wage and salary administration & office operation section of the personnel department at Duquesne Light Co.

Marion I. Winter, becomes sales manager of Arkansas Power & Light Co's southwest division. He succeeds **A. P. Mitchell** who takes over the promotion of all-electric Medallion Homes and electric house heating for the utility.

Idaho Power Co has made **Donald S. Bailey** manager of division and operations. Succeeding him as southern Idaho division manager in Twin Falls, is **Earl Haroldsen.**

Three utilitymen have been appointed to the Chamber of Commerce of the United States' Natural Resources. They are: **Austin D. Barney,** chairman of the board, Hartford Electric Light Co; **J. K. Busby,** president, Pennsylvania Power & Light Co; and **Ronald M. Ketcham,** assistant to the vice president, Southern California Edison Co. Reappointed were: **P. A. Feringa,** assistant to the president, New Orleans Public Service Co; **J. C. Happenny,** vice president, Central

(Continued on p 161)



"READY-TEST" FEATURE (back-off-screw) or "BLADE-THRU-JACK" Type METER TEST SWITCHES IMMEDIATE DELIVERY

MAKERS OF FAMOUS Roto-Test SWITCHES

Standard Catalog types or your specifications. See our Bulletin 492 . . . or write . . . or phone

LARGEST EXCLUSIVE MANUFACTURERS OF METER TESTING DEVICES . . . .

GLendale 2-3497

SWITCHES
ENCLOSURES
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METER DEVICES
COMPANY • CANTON, OHIO

YOU CAN GIVE BETTER SERVICE CONTINUITY WITH

RUGGED

WESTINGHOUSE 1¼%-STEP REGULATORS

Are your regulators rugged enough to meet *all* the conditions they're likely to encounter over a long period of service? Well, here is an exclusive Westinghouse idea that greatly lengthens contact life. Westinghouse regulator contacts are designed to give maximum contact life under all conditions. Higher current ratings make use of a unique magnetic effect to multiply contact pressures under short circuits to prevent burning. Normal contact pressures are maintained under usual operating conditions to prevent galling.

With Westinghouse voltage regulators, you get this and many other exclusive benefits that mean longer, more dependable service. For full details, call your Westinghouse representative. J-70922

Westinghouse URF and URL single-phase feeder voltage regulators

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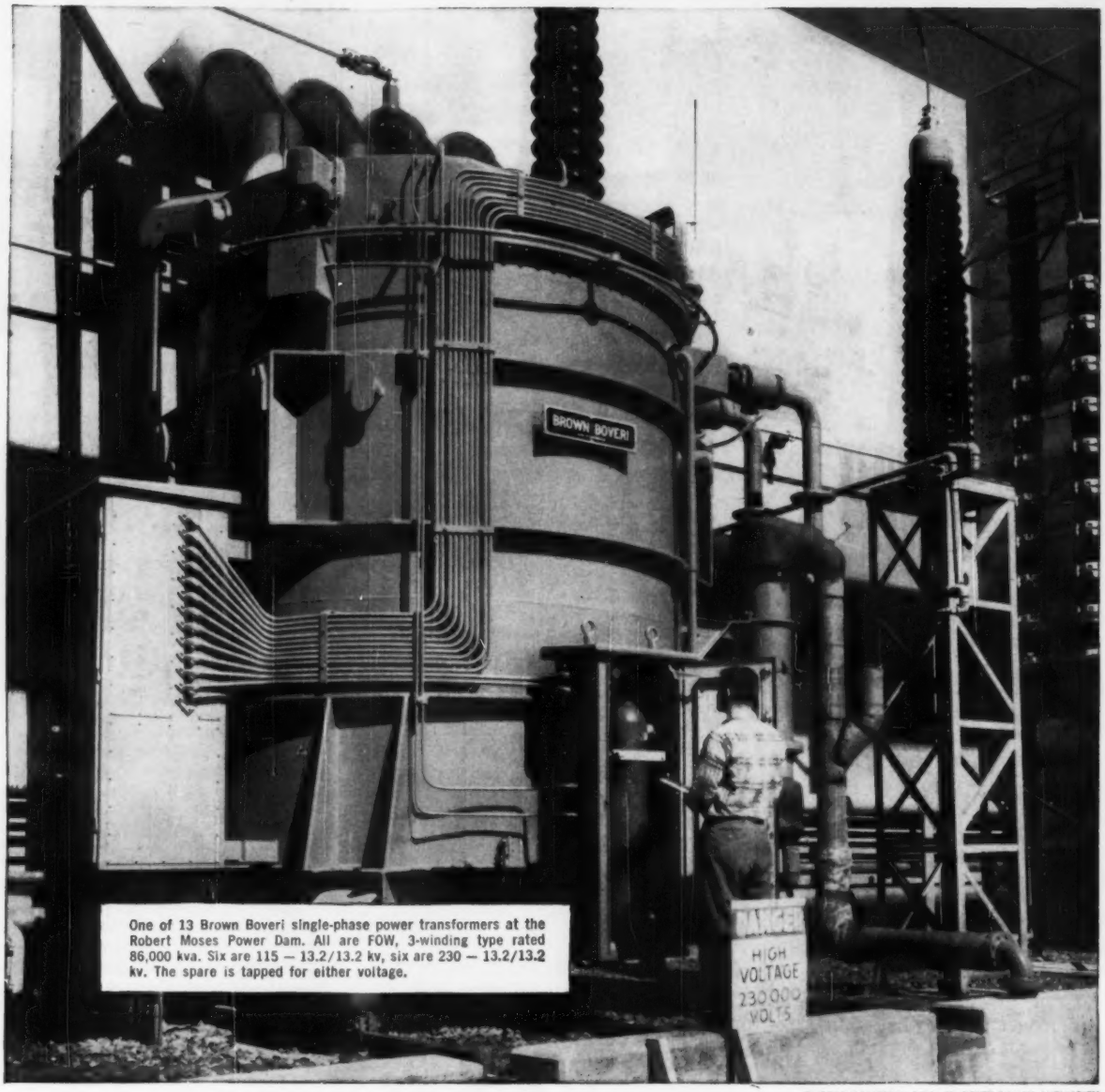


One of 13 Brown Boveri single-phase power transformers at the Robert Moses Power Dam. All are FOW, 3-winding type rated 86,000 kva. Six are 115 — 13.2/13.2 kv, six are 230 — 13.2/13.2 kv. The spare is tapped for either voltage.

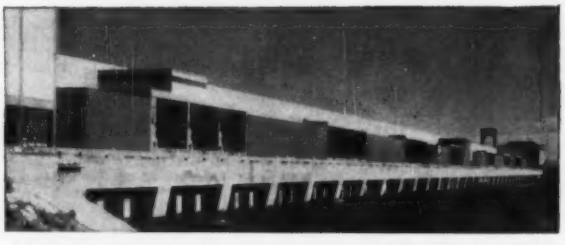
PHOTOS COURTESY OF N. Y. STATE POWER AUTHORITY

ALL'S QUIET AT MASSENA

You've heard the experts say it: Low noise means good design, tight construction. We agree. It's worth a trip to Massena just to hear the quiet around these Brown Boveri transformers.

Other features that can't be heard: the compact size, the light weight per kva, the high efficiency, the reliable service facilities . . . and the substantial dollar savings for a cost-conscious power producer.

Many of these features are due to Brown Boveri's exclusive radially laminated core. We'll be glad to give you full information about this core design and other features of Brown Boveri power transformers.



The Moses-Saunders Power Dam near Massena, N. Y., second largest hydro plant in the U. S. It was constructed jointly by the Power Authority of the State of New York and The Hydro-Electric Power Commission of Ontario.

BROWN BOVERI Brown Boveri Corp., Dept. EW10, 19 Rector Street, New York 6, N.Y. Agents in 27 U.S. cities.

Illinois Public Service Co; **John Paul Lucas, Jr.,** vice president and director, Duke Power Co; **James H. McGuire,** vice president, The Southern Co; and **Ernest R. Mitchell,** manager, Union Light, Heat and Power Co.

J. Wesley Lewis has been named assistant manager of Duke Power Co's Durham, N. C. district. He was succeeded by **John F. Smith** as Kannapolis manager. **Earl J. Norris** has been promoted to electrical superintendent in the Gastonia district.

Mendall H. Long has been named maintenance engineer with the Carolina Power & Light Co's power production group. **E. G. Hollowell** has succeeded him as superintendent of the company's Louis V. Sutton steam-electric generating plant in Wilmington, N. C.

R. L. Fraser becomes manager of the Naples district at Florida Power & Light Co. **A. E. Canant,** former manager, will be a consultant to Fraser.

Cleveland Electric Illuminating Co has named **Donald Pokorny** project engineer in the forecast and special studies section, and **Franklin Fearing,** general supervisor of the section. **Mitchell Kress** has been named general supervisor, personnel services section, personnel department. **Edgar Maugans** has been promoted to associate project engineer, **Robert Coan** to manager, marketing services department, and **William Romell,** analyst in the personnel department.

W. Leonard Hill has retired and **Frederick L. Nettell** has succeeded him as electric superintendent for the Sacramento division at Pacific Gas & Electric Co.

William A. Adams, Jr., will supervise the Schiller and nearby floating power plant Resistance units for Public Service Co. of New Hampshire.

C. J. Hoke has assumed duties as assistant division manager in Topeka for Kansas Power & Light Co.

Robert R. McLagan has become supervisor of Portland power district for Pacific Power & Light Co. He replaces **John A. Hooper** who retired recently after 40 years with the company.

C. K. Millen has been named superintendent of planning and analysis at Public Service Co of Colorado. **James R. Birrell** becomes assistant purchasing agent.

Albert Gruber has been named economic development engineer for Washington Water Power Co.

Oscar V. Sessoms, Jr., has been appointed manager of the Virginia Electric & Power Co real estate department. He fills the vacancy created by the death of **F. W. Collins.**

Westinghouse Electric Corp's **Reese Mills,** the first manager of the electric range department, has retired after more than 40 years of service.

Yale & Towne Manufacturing Co has named **Edward D. Hoban** chief engineer-government contracts for the Yale materials handling division. **Harry Hein** has been made electric truck sales engineer.

Karl M. Guest has been named assistant manager of pulp manufacturing for the Brown Co.

Line Material Industries has named **Jim Willrodt** field engineer in the West Coast region. **Dave Laird** has been added to the field engineering staff in the North Central region.

Carl T. Maxwell has been appointed special assistant to the executive vice president of Foster Wheeler Corp.

D. M. Williamson has been appointed to the newly created position of director of manufacturing for the West Coast plastics division operations of Monsanto Chemical Co. **R. H. Dunlop** has been named plant manager. **J. F. Fincke** was promoted to assistant director of research.

National electric division, H. K. Porter Company, Inc., has made these appointments: **Kenneth C. Crain, Jr.,** works manager; **Robert Johnson,** director of engineering; **Everett L. Kimball,** steel engineering

(Continued on p 162)

YOU CAN GIVE BETTER SERVICE CONTINUITY WITH

CONVENIENT

WESTINGHOUSE 1¼%-STEP REGULATORS

In addition to dependable operation, convenience and versatility are reasons that make regulators more valuable to you. With pad- or platform-mounted URF units, for example, Westinghouse supplies a hand crank for manual operation of the tap changer. Positions may be changed with the regulator de-energized or motor circuit inoperative.

For data on this and many other exclusive convenience features of Westinghouse regulators, get in touch with your Westinghouse representative. J-70923

Westinghouse URF and URL single-phase feeder voltage regulators

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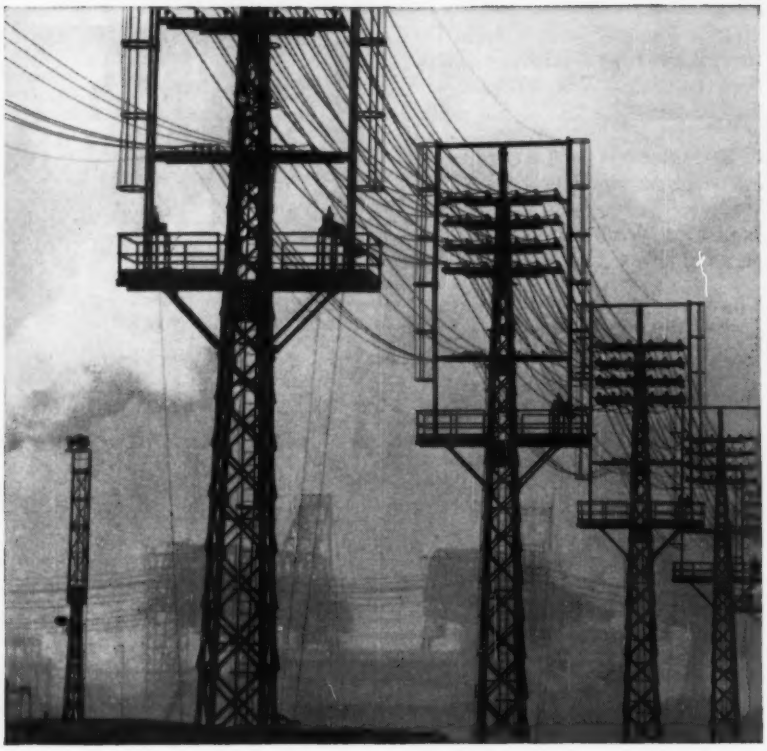


Solved! Electrical load-flow calculations on networks of up to 100 busses and 270 lines

Royal Precision

LGP-30

Electrical utilities get top efficiency in production, sales and purchasing with the Royal Precision LGP-30 electronic computer marketed by Royal McBee. Among utility problems now being *economically* solved with this versatile computer are load flow calculations and the forecasting of optimum turbine-generator and boiler usage under varying conditions of system demand.

A general purpose computer, the LGP-30 can solve any utility computational requirement. Special provision for program modification – while calculations are in progress – makes it practical to study the effect of minor changes in a part of the network system. Its large (4096 word) memory assures the efficiency and flexibility of stored program operation required to solve complicated electrical utility problems involving large quantities of instructions and variable data.

The LGP-30 is simple to program and operate. Your own engineers soon develop a man-machine relationship to the point where the LGP-30 becomes an extension of their own thinking capacity. No site preparation is necessary. Plug it into the nearest outlet and it is ready to go to work. Customers have access to an extensive library of programs and sub-routines – as well as the opportunity to join an active users organization.

Royal Precision Corporation

Royal Precision is jointly owned by the Royal McBee and General Precision Equipment Corporations. LGP-30 sales and service are available coast-to-coast, in Canada and abroad through Royal McBee Data Processing offices. For complete specifications on the compact LGP-30 and your copy of Application Report #11 write **ROYAL McBEE CORPORATION,** data processing division, Port Chester, N.Y.

manager; and **Robert A. Ditchendorf,** industrial engineering manager.

F. H. Foglesong has been named to the newly created position of manager of alloy sales for Babcock & Wilcox Co's tubular products division.

John P. Horan has been named market research manager of Yale materials handling division, Yale & Towne Manufacturing Co.

Carl B. Wille has been promoted to director of engineering for the Carborundum Co.

Willis Ditmanson has been named national parts and service manager for Motorola Communications & Electronics Inc.

Herman H. Riesmeyer has been appointed manager of the Gary, Ind. branch office of Clark Controller Co.

John E. Gornet has been made manager of the custom design department, Day-Brite Lighting, Inc.

R. L. Lock, senior vice president of engineering and research at Anderson Electric Corp has been elected to the Southeastern District Council of the American Society for Testing Materials.

Robert D. Hallock has been appointed manager of the Leach Corp Inet division.

Yale & Towne Manufacturing Co has named **Edwards G. Stanhope** Yale hoisting equipment district manager for the New England area.

Paul M. Ritty has been placed in charge of industrial vegetation control projects for the agricultural chemicals development section of Dow Chemical Co. He will work with power companies and other industries on control of weeds, brush and grass problems.

Eldon Alexanderson has been appointed reactor engineer for the Enrico Fermi Atomic Power Plant.

Paul H. Dandurand and John Sher-

(*Continued on p* 165)

CUT THE COST OF DITCHING WITH AUBURN TRENCHERS

You get more trench for your money – day in and day out – and at less cost with an **Auburn**. Thousands of **Auburn** owners have proved it. The Auburn has low initial cost. It's virtually trouble-free; works in soil where others can't; and, it requires only one man to operate it. The **Auburn** is rugged, but simple in design. It has fewer moving parts, less chance to break down. A unique, variable speed drive automatically adjusts the speed to changing soil conditions, and it will dig up to 800 feet per hour. Trenches from 6 to 14 inches wide and down to 6 feet. Special bits are available for rock, shale, or frozen ground.

Auburn is the world's largest producers of trenchers.

AUBURN GEAR-DRAULIC

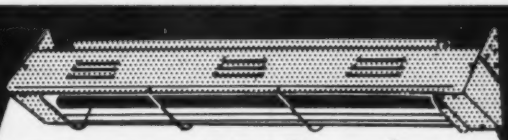
Tractor-mounted trenchers are available for M-F Work Bulls, IH Utility, John Deere Crawler and Wheel Industrial, and Ford Tractors.

Jeep-A-Trench GEAR-DRAULIC

the original Jeep-mounted trencher, and only trencher approved by Willys Motors. Available at Jeep Dealers.

WRITE FOR COMPLETE INFORMATION and Dealer's Name 2040 South "J" Street

AUBURN MACHINE WORKS, INC. AUBURN, NEBRASKA, U.S.A.

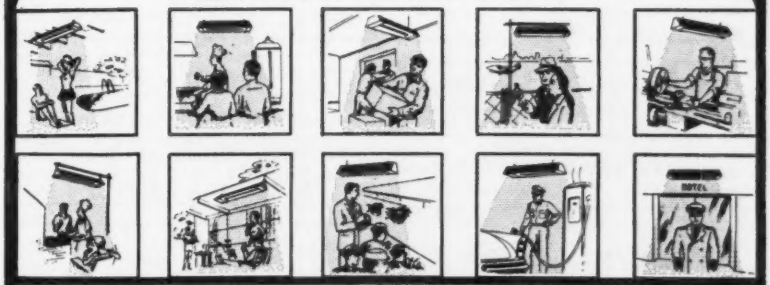


ELECTROMODE Quartzone

TUBE INFRARED Electric HEATER

Designed for CONTROLLED AREA HEATING, INDOORS or OUTDOORS; High energy rays emitted from Quartzone Tube are channeled in rectangular area by polished aluminum reflector. Heater has many industrial, commercial and residential applications. Controlled by on-off switch, time switch or thermostat. Quartzone Tube has high resistance to thermal shock. Heaters are supplied with universal brackets for chain suspension or for bolting to ceiling and wall brackets.

Shown below are a few of the many uses.



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YOU CAN GIVE BETTER SERVICE CONTINUITY WITH

GREATER CAPABILITY

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Raymond A. Hibler has joined the industrial relations department of Commonwealth Services Inc to work as a consultant in the areas of organization planning, wage and salary administration and labor relations.

OBITUARY

L. Ivan Mulkey, 58, a civil engineer in the design section of Pacific Power & Light Co . . . **Alfred L. Pierce,** 91, for 54 years general manager of Borough Electric Works (Conn.) . . . **J. H. Devor,** president, Wagner Electric Corp . . . **C. G. Coughlin,** 51, manager of Appalachian Power Co's Cabin Creek plant.

C. P. Altland, 64, manager of purchases for Southern California Edison Co . . . **Harold S. Vance,** member of the Atomic Energy Commission since 1955 . . . **H. A. Tibbs,** 85, former general superintendent of Duke Power Co power plants . . . **Cecil Cowdell,** 48, superintendent of Murray City Light & Power Co, Utah . . . **Walter D. Myers, Sr.,** 78, retired vice president of Louisville Gas & Electric Co . . . **Harold Pender,** 80, former dean of the Moore School of Electrical Engineering at the University of Pennsylvania.

Charles Sylvanus Walters, 87, vice president and a former director of Carolina Power & Light Co . . . **Albert T. O'Neill,** 74, president of Canadian Niagara Power Co, and former vice president in charge of the western division of Niagara Mohawk Power Corp . . . **Paul R. Turner,** 65, former director of sales of the Electro-Motive Division of General Motors Corp.

New High Dam . . .

. . . plan for Mountain Sheep filed by power firms' group

Pacific Northwest Power Co has filed a revised license application with the Federal Power Commission for construction of the High Mountain Sheep Dam. The FPC is expected to set a hearing date on the plan soon.

If the revisions are authorized, the project would include a dam 690 ft high creating 3.6-million acre-ft of storage. Ultimate generating capability would rise to 2-million kw. Total cost of the project would be $178 million—$86.27 million for the dam and waterways, $30.085 million for turbines and generators, and $17.4 million in interest.

Work would begin at the site, which is on the Snake River just above the confluence of the Salmon River, on Oct. 1 of the first available year. Power output would commence after 57 months of construction.

The proposed plan includes fish trap facilities and a "reasonable sum" to be spent on recreational development for the lake, which would extend 58.7 miles up the Snake and also up the Imnaha rivers. This water would rise 35 ft onto tailwater of low Hells Canyon Dam, requiring operating arrangements with Idaho Power Co. The lake would cover 17,200 acres.

The proposed dam elevation of 1,510 ft is the same as that recommended in the recent Columbia River report of the Army Engineers.

Initial generating capacity would be 875,000 kw from five units—three on the Oregon-side powerhouse, two on the Idaho side.

High Mountain Sheep Dam, along with a proposed lower canyon dam on the Snake at 1,575-ft elevation, would produce a total of 5.6-million acre-ft of storage and 3.3-million kw, says PNP Pres John Burke. A single "Nez Perce development would provide lesser resource development than the two others combined," Burke adds. The lower canyon project is not mentioned in PNP's present application.

PNP is made up of four power companies in the region.

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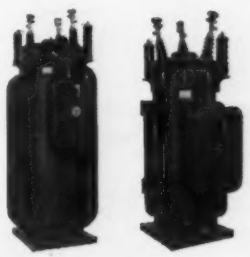

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• **31st Annual Boston Conference on Distribution**—Hotel Statler-Hilton, Boston, Mass., Oct. 19-20.

• **American Society of Civil Engineers**—Annual Convention, Washington, D. C., Oct. 19-23.

Edison Electric Institute—Area Development Committee, Westward Ho Hotel, Phoenix, Ariz., Oct. 20-22; Statistical Committee, The Homestead, Hot Springs, Va., Oct. 22-23.

• **National Association of Corrosion Engineers**—North Central Region Conference, Statler Hilton Hotel, Cleveland, Ohio, Oct. 20-22.

• **National Safety Council**—Public Utility Section, Conrad Hilton Hotel, Chicago, Ill., Oct. 21-22.

• **Fourth Electric Comfort Heating and Heat Pump Conference**—Sponsored by Electrical World, Chase-Park Plaza Hotel, St. Louis, Mo., Oct. 21-22.

Pennsylvania Electric Association—Prime Movers Committee, General Brodhead Hotel, Beaver Falls, Pa., Oct. 22-23; Relay Committee, Hotel Alexander, Hagerstown, Md., Oct. 29-30.

• **Southeastern Electric Exchange**—Accounting Conference, Shoreham Hotel, Washington, D. C., Oct. 22-23.

• **Oklahoma Utilities Association**—Accounting Section, Jens-Marie Hotel, Ponca City, Okla., Oct. 23.

• **Rocky Mountain Electrical League**—56th Annual Fall Convention, Broadmoor Hotel, Colorado Springs, Colo., Oct. 25-29.

• **Joint Solid Fuels Conference**—Sponsored by the Coal Division of the Society of Mining Engineers of AIME and the Fuels Division of The American Society of Mechanical Engineers, Netherland-Hilton Hotel, Cincinnati, Ohio, Oct. 27-29.

• **Computer Applications Symposium**—Sponsored by Armour Research Foundation of Illinois Institute of Technology, Morrison Hotel, Chicago, Ill., Oct. 28-29.

• **American Society of Refrigerating Engineers**—Semi-annual Meeting, Traymore Hotel, Atlantic City, N. J., Oct. 30-Nov. 1.

NOVEMBER

• **Atomic Industrial Forum**—Annual Meeting, Sheraton-Park Hotel, Washington, D. C., Nov. 2-4.

• **11th Exposition of the Air Conditioning and Refrigeration Industry**—Convention Hall, Atlantic City, N. J., Nov. 2-5.

• **New Jersey Utilities Association**—Annual Meeting, Seaview Country Club, Absecon, N. J., Nov. 4-6.

• **American Nuclear Society**—Winter Meeting, Sheraton Park Hotel, Washington, D. C., Nov. 4-6.

• **Pennsylvania Electric Association**—Meter Committee, Pick-Roosevelt Hotel, Pittsburgh, Pa., Nov. 5-6; Transmission and Distribution Committee, Penn Alto Hotel, Altoona, Pa., Nov. 12-13.

• **Pacific Coast Electrical Association**—Seventh Biennial Conference, Princess Kaiulani Hotel, Waikiki, Honolulu, Hawaii, Nov. 5-6.

• **Edison Electric Institute**—Accident Prevention Committee, Hotel Dennis, Atlantic City, N. J., Nov. 9-11.

• **Institute of Radio Engineers**—Fourth Instrumentation Conference and Exhibit, Atlanta Biltmore Hotel, Atlanta, Ga., Nov. 9-11.

• **National Electrical Manufacturers Association**—Annual Meeting, Traymore Hotel, Atlantic City, N. J., Nov. 9-13.

• **Electric Council of New England**—Third Annual Conference, Hotel Somerset, Boston, Mass., Nov. 12-13.

• **Conference on the Utilization if Atomic Energy**—Second Annual Meeting, A. & M. College of Texas, College Station, Texas, Nov. 12-13.

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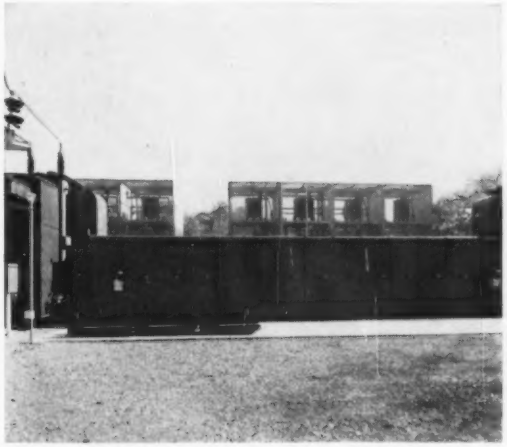

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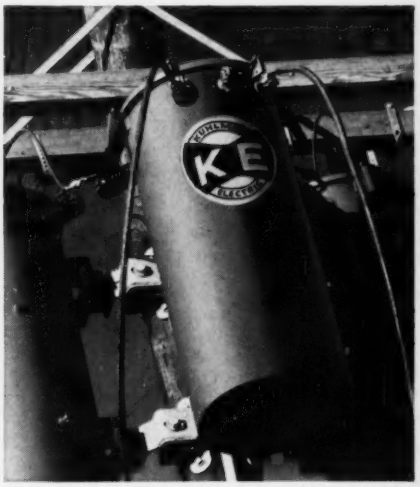

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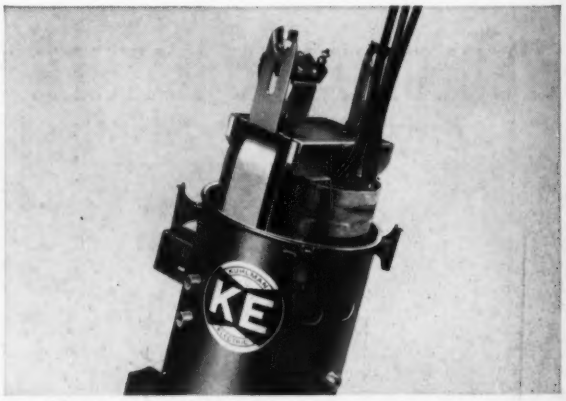

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